THE IRON AGE

June 4, 1931

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"A PICTURE IS WORTH A THOUSAND WORDS"

—Chinese Proverb

"YOUR story in pictures leaves nothing untold," runs the slogan of the commercial photographers. Like many slogans, it contains a bit of exaggeration. But in most instances the thought is transmitted with the least friction by a happy wedding of pictures and text. So, in The Iron Age illustrations are used liberally. The last three issues, for example, all of them typical, contained 176 illustrations in the editorial pages alone, not including illustrations used for ornamentation. That is close to 60 an issue.

On this subject of pictures, Frank C. Pickard, works manager of the Standard Stoker Co., Erie, Pa., writes:

"We like to see pictures of various shop interiors, as we frequently pick up suggestions from these pictures that we can use."

—A. H. D.

76th IRON AGE YEAR

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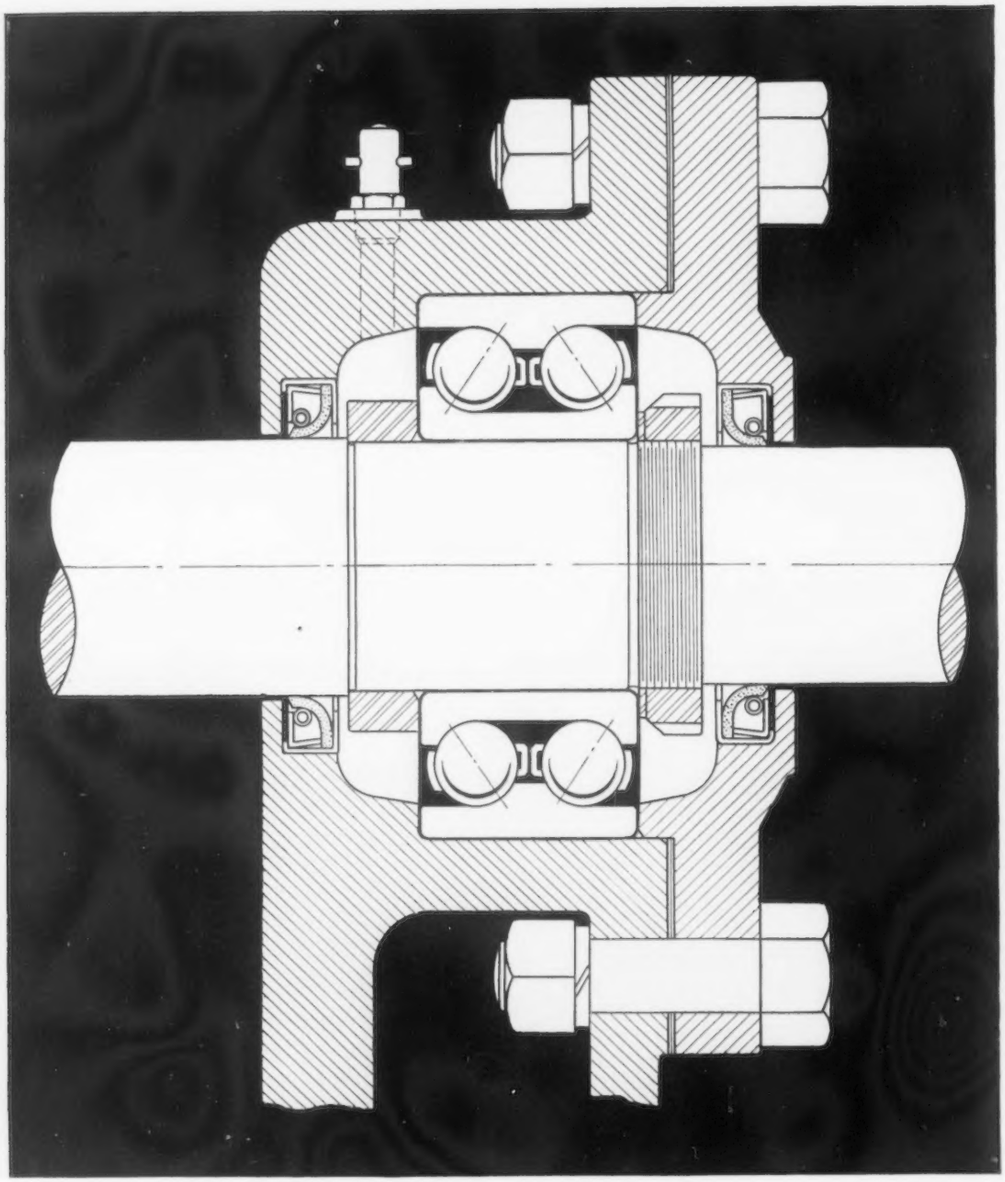

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The New Departure Double Row bearing is a rigid, rugged, easily installed unit. Races are solid forgings. Balls are as large and numerous as a balanced design will permit. Separators are light, strong and durable. Preloaded at assembly, the Double Row has no end-play nor looseness . . . never needs adjustments. The angular contact of balls with races, combined with other features of design, give it tremendous thrust capacity and radial stability. The New Departure Manufacturing Company, Bristol, Connecticut; Detroit, Chicago, San Francisco and London.

1745

NEW DEPARTURE BALL BEARINGS

This Issue In Brief

JUNE 4, 1931

NEXT WEEK

THE most effective way of cutting labor costs, according to Charles M. Schwab, is by improving production facilities. "Improve the routing of your materials, add modern machinery, improve supervision and planning and other efficiencies," he advises.

Mr. Schwab's counsel is backed up by a half century of experience as a practical and successful industrialist. To carry his thought a step further, modernization of equipment and methods not only cuts unit labor costs and tends to protect wage scales but also provides the one dependable way of putting business on a profit-making basis.

This concept, while not a new one, has been under attack latterly because of the confused, and at times hysterical, thinking set in motion by the business depression. It needs new emphasis in the light of current conditions. The present, a business authority will say in our next issue, is no time for American industry to fall under the spell of false gods.

Hard Times Hit Apprentice Training

Interruption in apprentice training is a doubtful economy unless conditions are extreme. The investment can not be salvaged if apprentices are released.—Page 1803.

* * *

One Way to Cut Inventory Safely

Keeping all material in process constantly on the move usually permits a safe reduction in inventory, and with it a lower necessary working capital.—Page 1807.

* * *

How to Calibrate an Optical Pyrometer

Calibrated broad-filament lamp is matched in brightness with optical pyrometer lamp. Current needed by the two is measured.—Page 1813.

* * *

Shrinkage Cavities Absent in Centrifugal Gun Casting

if properly made. The density of the metal is slightly greater than in a forging of the same composition.—Page 1817.

* * *

Centrifugal Castings Can Be Cold-Worked Readily

Gun castings can be cold-worked to twice the percentage of bore enlargement permissible with forgings.—Page 1817.

* * *

Hot-Rolls Phosphorus-Copper Alloys Successfully

at 450 to 650 deg. C. to produce strip 0.021 in. thick. But only small reductions of thickness should be made in each rolling.—Page 1818.

* * *

You Can Safely Spend $6,700 in Equipment to Save $1,000 in Labor Cost

The cost of the investment is usually assumed to be 15 per cent, including interest, obsolescence, taxes, insurance, etc.—Page 1819.

* * *

Where Nitriding Fails

Nitrided parts fail to stand up under severe abrasion or heavy impact. They likewise show low resistance to mineral acids.—Page 1825.

Estimates Electrification Would Save Steel Makers 125 Millions Yearly

Electrified plant is credited with a production cost of more than $2.50 a ton under steam-driven plant.—Page 1819.

* * *

Continuous Plate Mill Will Have 3 to 5 Times the Output of the Old-Type Mill

Will roll plates up to 90 in. in width, and will produce 50,000 to 75,000 tons a month.—Page 1820.

* * *

To Keep Down Nitriding Growth, Avoid High Temperatures

Increase in size is very slight if high nitriding temperatures are avoided in the initial stages. In pieces of thin, complicated section, growth may cause distortion.—Page 1823.

* * *

"Highest Hardness and Wear Resistance of Any Steel-Treating Process"

Original claim made for nitriding still holds.—Page 1823.

* * *

Enameled Containers in Service for 2700 Nitriding Hours

Results obtained seem highly promising.—Page 1825.

* * *

What to Do with the Apprentice When Work Is Scarce

If the indenture does not provide for "unassigned time," which permits the employment of the apprentice on any kind of shop work, a change can easily be made with the consent of all parties concerned.—Page 1828.

* * *

Job Shop Can Cut Handling Costs

Work need not be repetitive to get the benefit of mechanical handling if the possibilities of handling equipment are properly understood.—Page 1806.

* * *

Gun-Making Time Cut Two-Thirds by Centrifugal Casting

Cost is only two-thirds that of the ingot-forging-built-up method.—Page 1817.

ANNOUNCING

The new High Speed 12"FAY AUTOMATIC LATHE

With new tooling possibilities and greater speed

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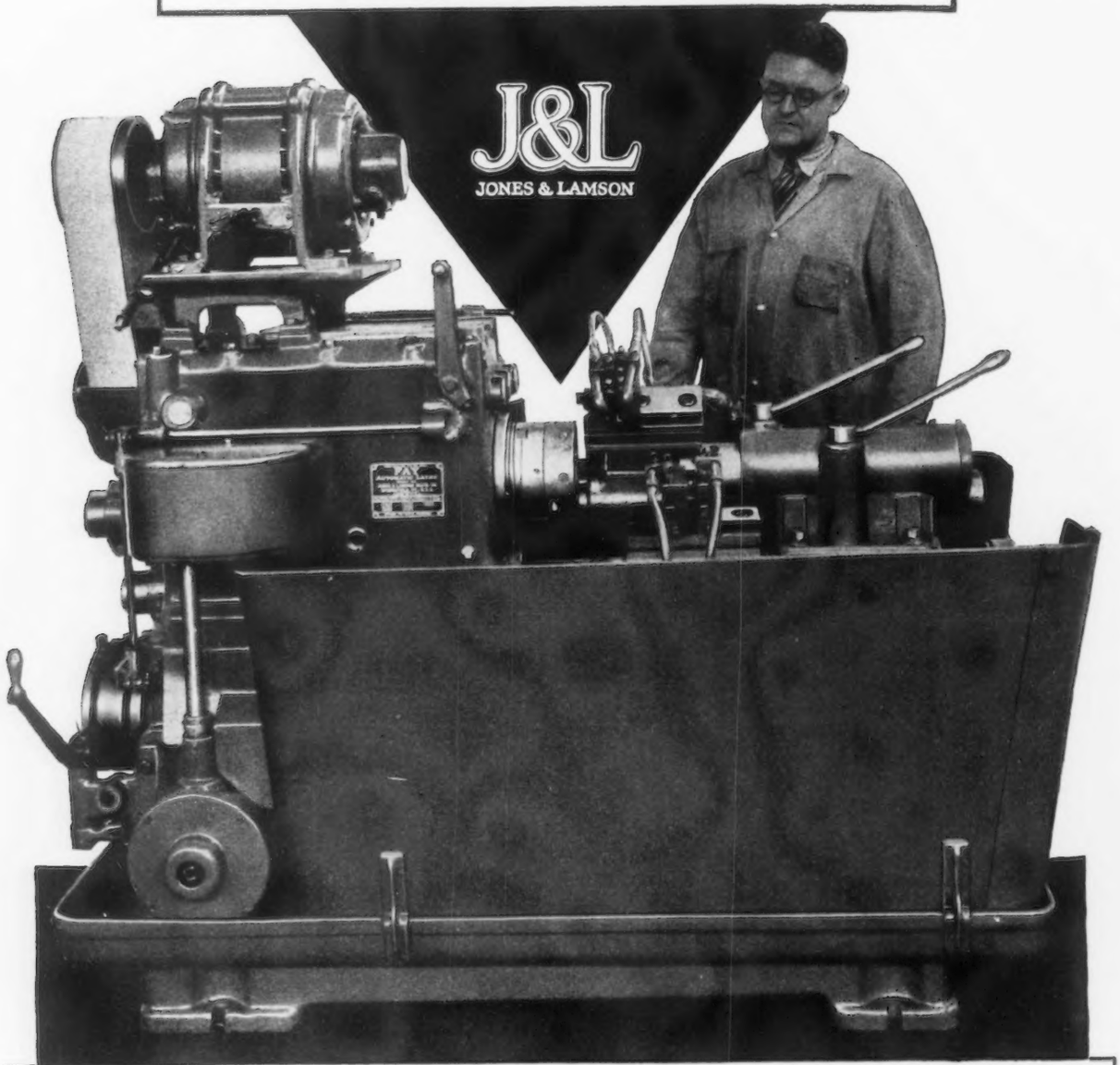

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..THE IRON AGE..

NEW YORK, JUNE 4, 1931

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WHAT ABOUT APPRENTICES THESE DAYS?

By C. J. FREUND

Apprentice Supervisor, Falk Corpn., Milwaukee

APPRENTICE training, like all other items of plant expense, becomes a burden in hard times. But it is false economy, according to the author, to abandon an apprenticeship course. Interruption of apprenticeship training largely destroys its value to the learners. It discourages future enrollment in training courses and alienates the support of the public. Apprentices should be put on part time, if necessary, like the regular force, but, in the opinion of Mr. Freund, should not be dismissed either individually or as a body.

THE common council or board of aldermen of a large American city is meeting in a special session to determine ways and means for relief from the tax burden on the community during the depression. An influential and respected member of the board seems to have found the solution. He contends as follows:

"It seems to me that the only way out of the difficulty is to close the schools. We all know that the schools absorb about 40 per cent of the tax money. Education is not a matter of immediate necessity, such as fire and police protection and the lighting and cleaning of the streets. We interrupt the educational process for three months every summer and under the circumstances it appears necessary to interrupt education for a year or more until conditions improve. I suggest that we lay off all teachers and retain merely a skeleton organization for maintenance of the buildings and equipment."

After some deliberation the plan is adopted and within a month the weeds in the school grounds have grown a foot high and cobwebs have gathered in the doors and windows of the buildings.

Has anything like this ever happened? Of course not. American people feel that public education may not be tampered with under any circumstances.

Now, apprentice training is to industry just exactly what public education is to the community, the preparation of the young man for the future. The public is in dead earnest about education. Does industry take apprenticeship as seriously? By no means, in spite of exceptions here and there.

The board of directors of a machinery-building corporation has met to make adjust-

ments required by present business conditions. At the moment apprentice training is up for discussion and the most influential member of the board is speaking.

"Of course apprentice training is laudable and necessary in a general way, but it is not a matter of immediate consequence, such as raw materials and sales expense. Under the circumstances it appears necessary to eliminate apprentice training until such time as business improves. Of course, the apprentices do some work, but it is slow and otherwise ineffective and it can be done better and undoubtedly cheaper by a few men. I recommend, therefore, that the general superintendent be instructed to dismiss the apprentices and their supervisors in order to reduce the payroll."

One or two feeble protests are made regarding the agreement under which the apprentices are employed, but these are quickly silenced, the proposal is adopted and that evening the apprentices are all told to remain at home indefinitely and within three more days the supervisor and his assistant and the three instructors have gone also.

Has this ever happened? It surely has; not once but many times. Frequently it is all done by shop officials long before the question is ever put up to the officers.

Of course, under extreme conditions the training of apprentices must be discontinued, however undesirable it may be to do so. For instance, it is impossible to train apprentices in a plant which has been closed down completely, nor can a corporation which has been liquidated complete the training of its apprentices. However, the industries must continue the training of apprentices as long as it is physically possible, just as the communities will continue the education of young boys and girls in spite of every obstacle.

A district or community apprentice training program has a distinct advantage in the extreme case of a plant's being shut down completely. The apprentices from this plant may then be distributed among the other shops in the association in order to complete their training period.

One reason why apprentice training must be continued at all costs is that apprenticeship of necessity extends over a period of years. It takes three or four years to graduate an apprentice and much longer than that to derive from apprentice training any appreciable results. If the program is interrupted at more or less regular intervals, no results at all can be expected.

A manufacturer could not accomplish much in building up a sales organization if he discharged all his salesmen periodically, tried to get along without them for a time and then determined once more to engage a sales force. Few salesmen would care to work for him and the effect of such procedure upon his business need not be discussed. Similarly, a business man's accounts would always be in confusion if he discharged his entire accounting department and permitted all bills, statements, checks and reports to accumulate for several months or half a year and then engaged bookkeepers once more to straighten out his affairs.

By the same token, he can expect nothing from apprentice training if he wants to interrupt the work every time there is a pause in the progress of general prosperity.

Sixty-three apprentices were employed in a well-known machine shop at the beginning of the year 1924. A number were about to graduate, a dozen or so had reached the third year of the course and the remainder were distributed equally between the first and second years. A few of the older boys had become the equal of the better mechanics in the shop and several had served on occasion as inspectors and in other responsible positions.

When business fell off early in that year the elimination of the apprentice payroll looked like an obvious saving, and the superintendent told the apprentices to go home and that they would be recalled as soon as the depression had passed.

Work did pick up after a few months and the superintendent sent letters to all the apprentices directing them to return. Out of the 63 apprentices just 12 reported for work. The remainder had found employment elsewhere; many had become apprentices in other shops, where they completed their courses.

All effort devoted to the training of the 51 who failed to return was wasted so far as the original employer was concerned, all that they had learned in their apprenticeship classes at his expense was now devoted to the progress and prosperity of his competitors, all that they had learned about his product and processes was lost.

The superintendent engaged a quota of new apprentices and again went through all the concentrated difficulties which necessarily are associated with the first year of an apprentice's work. However, he had learned his lesson and when business fell off again in 1927 he was careful to retain all apprentices, and in the present depression he has done likewise.

Confidence of Public Essential

There is another angle to this problem. In order to be successful, an apprentice training program requires the interest and support of the public, of the people in the community. A boy will not sign a contract for a steel molder apprenticeship if his parents, his teachers, the principal of his school, the pastor of his church and the scoutmaster of his troop all advise him against it.

The confidence of the public will soon be dissipated if the employer thinks that apprentice training can be carried on only in prosperous years. An example will make this clear. A manufacturer of agricultural implements operated the only large industry in a medium-sized city. Isolated as he was, he felt the need of highly trained men and in 1922 instituted an apprenticeship to meet his requirements. As he desired high-grade men for responsible positions rather than workers of rank and file, he made the apprenticeship available only to high school graduates.

By the beginning of 1924 he had 30 or 35 apprentices in his plant, but business was not good in that year and as a measure of economy he laid off his apprentices for seven or eight months. Again in 1927 orders fell off and again the apprentices were dismissed. When business picked up in 1928 he was surprised to find that many of the boys did not return and, moreover, that he was unable to engage others to take their places. Much puzzled, he invited the principal of the high school to lunch with him at his club and discuss the matter with him. In a few moments the principal cleared up the entire situation:

Danger of "Fair Weather" Policy

"The business of the school is not merely to educate young men as well as we can but also to guide and direct the graduates and help them to get established in their life work," he explained.

"We advise them to get into occupations which give promise of stability and opportunity and warn them against or at least refuse to recommend others which do not seem desirable. We have watched your apprentice training work from the start. You have been sincere and we recommended your course to our graduates. In 1924 you laid your apprentices off. You could not be blamed for that because your training enterprise had just begun and adjustments were undoubtedly still necessary.

"Last year you laid them off again. It began to look to us as if your apprentice course, in spite of your evident personal sincerity, was merely a 'fair weather' process, to be carried on when business is good and discontinued when business is dull. Training young men and preparing them for their vocation is a fundamental function in the community; it transcends such comparatively unimportant matters as the ups and downs of business activity. If your apprentice training cannot be made continuous we simply cannot recommend it to our graduates any more than we could recommend them to attend a college of law which failed to continue its courses regularly year after year."

The implement manufacturer took these words deeply to heart and dictated them as well as he could from memory when he returned to his office. They are now the first paragraph in his "Statement of Apprentice Training Policy," from which they were copied for this article.

The manufacturer who desires to retain the confidence of the public, so essential to the success of appren-

(*Cont. on page* 1828)

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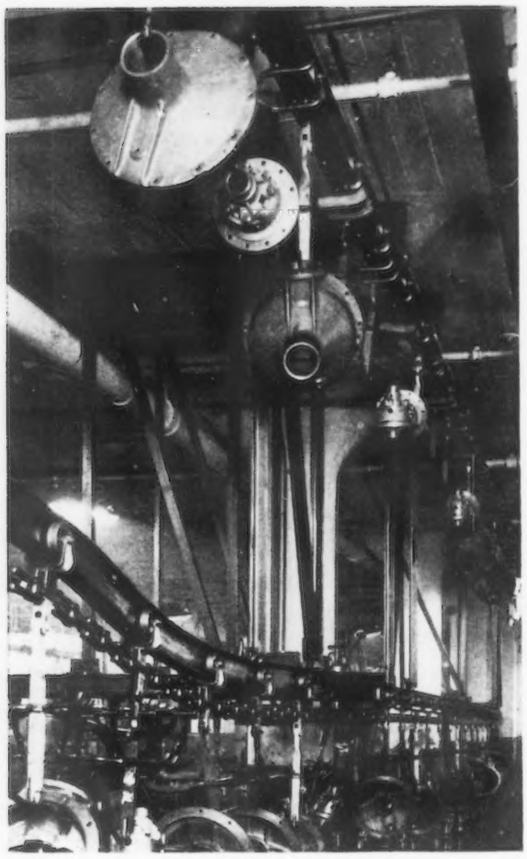


MATERIALS HANDLING IN QUANTITY PRODUCTION SHOPS

By NORMAN H. PREBLE
Chief Engineer, Jervis B. Webb Co., Detroit

AXLE parts at the Timken Detroit plant are carried from final machine operations to storage or assembly by this overhead conveyor.

Photograph, courtesy Jervis B. Webb Co., Detroit

WHILE undoubtedly the automobile manufacturer has done more toward the solution of handling problems in his machine shop than have others, there is, after all, no essential difference between his problems and the problems of any production shop. The problem is manifestly very different from that in a job shop where there is no continuous production of the same article, that is, where there must be a constant change in set-ups and in routing. Even in the job shop, however, there are many opportunities for increased efficiency, or decreased cost, if the possibilities of handling equipment are properly understood.

The most obvious purpose for the installation of handling equipment is to reduce non-productive cost of moving or handling the product as it passes through the plant. Not only is this the most obvious point of attack from a physical standpoint, but it is also an obvious point of attack because the average bookkeeping system will differentiate between productive labor and this type of non-productive labor, so that cost savings, or cost-savings opportunities, are immediately apparent. Possible savings are large, for it has been estimated that manufacturers as a whole pay almost as much for moving material inside their plants as they pay for all outside transportation. It is obvious that this is the point of attack which has been most frequent in American industry, but it is to be regretted that in a large number of instances the manufacturer has stopped here.

Savings Are Not Merely in Transportation Cost

The next most obvious purpose for the installation of handling equipment is an increase in the productive capacity of men or machines by reduction of the effort or time necessary to obtain and dispose of the pieces on which the operator is engaged, or by the maintenance of a constant supply to the operator or machine.

A great deal has been accomplished along these lines by the use of trucks, trailers, skid platforms and special racks, together with the more general use of slides or gravity rolls to feed from one machine to the next or from one operation to another,

MECHANICAL handling, while having been most intensively developed and applied in automotive plants, offers similar advantages in "production" machine shops of all kinds. Saving in cost of transportation is but one of many results secured by its proper application.

The means of securing these results, represented by the various types of handling equipment, are numerous. To make an intelligent selection the shop executives must be familiar with the means available for accomplishing the results to be obtained.

Mr. Preble, in the accompanying article, extracted from a paper recently presented by him at the Birmingham semi-annual meeting of the American Society of Mechanical Engineers, makes a broad survey of the means and ends of production handling.

but the possibilities of the continuously moving conveyor have been rather neglected except in a relatively few plants. In many machine set-ups the continuously moving conveyor can accomplish a great deal more than intermittent methods; also the use of such continuous conveyors is by no means as general as it well might be.

The decrease in inventory which can be produced by keeping all material in process constantly on the move will in many cases be found to be an item of very considerable importance, and this decrease in inventory is one of the less obvious results of proper handling methods. Not only will such decrease in inventory result in a lower necessary working capital, but it will materially improve production control, and in many instances will greatly facilitate inspection and decrease loss which may occur due to faulty workmanship or material. A by-product of proper handling methods is the ability to operate on smaller lots, without increasing handling costs, which in many instances will result in greater overall efficiency.

A fourth advantage, which in many instances will be as important as any other, is the increased productive capacity per unit of floor area which results from the reduction in space occupied by stock in process, storage banks, etc. This reduction will be even greater if, as is many times possible, the handling method selected is the overhead type of conveyor, which leaves the floors and aisles entirely clear.

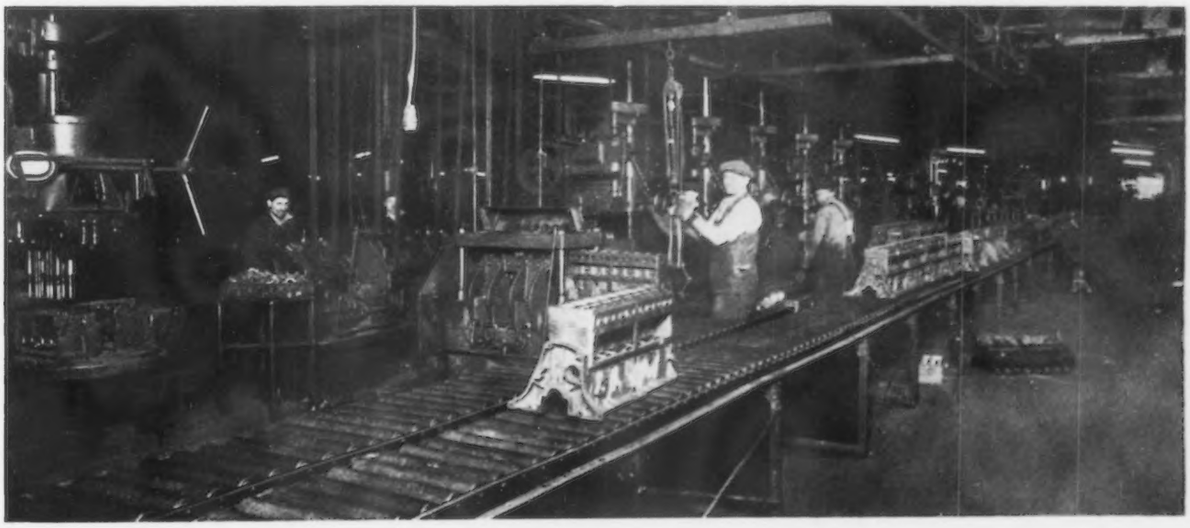
Reduction in Damage Often Important

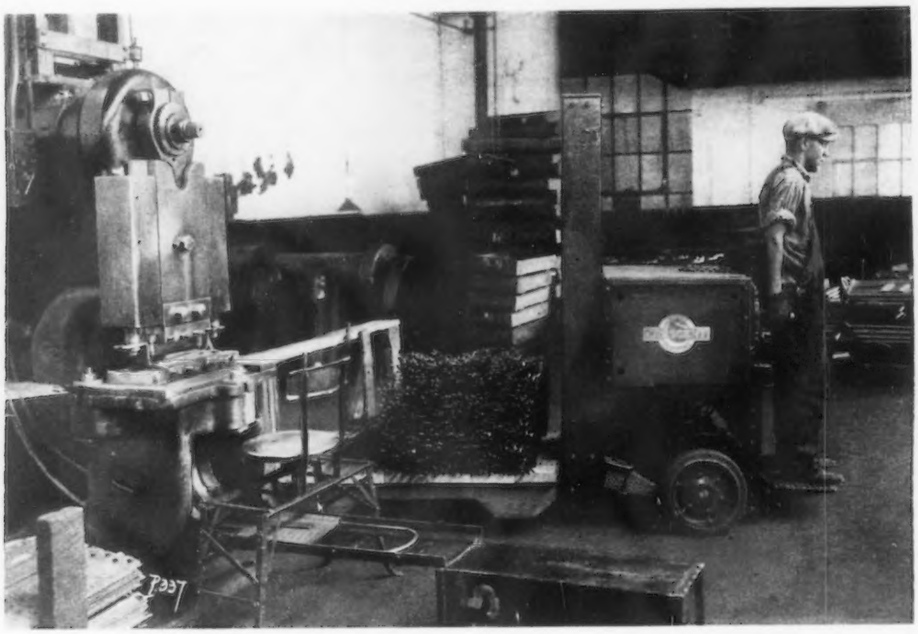
In some shops it has been found that by far the most important item to be considered in studying the handling methods was the reduction in damage to the parts in process, and this may well have a very considerable bearing upon the final selection of the equipment to be used. This is, of course, particularly noticeable in the handling of sheet metal, which is to receive a final high-luster finish, or in the machine shops working on finely finished gears, shafting or bearings.

In addition to these various items which can be more or less definitely analyzed, there is an indefinable improvement in general operating efficiency produced by an orderly appearance in the shop. Proper use of modern handling apparatus will also greatly simplify many of the problems of production control and supervision, resulting in de-

SEVENTY-FIVE per cent of the trucking operations have been eliminated at the Studebaker plant in the past two years through the installation of a complete conveyor system.

Photograph, courtesy Studebaker Corpn., South Bend, Ind.





TRUCKS and tractors are good examples of intermittent-operation, flexible-path handling equipment. Every machine shop has a place for at least some type of floor handling equipment.

Photograph, courtesy Crescent Truck Co., Lebanon, Pa

creased overhead and more efficient work throughout.

The extent to which these various results will affect the overall cost of a product will depend very largely upon the individual plant or more properly upon its layout. Also the extent to which handling apparatus, and more particularly continuous conveyors, can be used will depend upon the plant layout. However, it should not be forgotten that the mere fact that the plant layout is bad, that it is necessary to cross streets or railroads to go from one level to another and the like, may be all the more reason for the installation of new equipment. This is, perhaps, particularly noticeable where it has been found possible to put in overhead conveyors to cross streets or railroad tracks.

Eight Moves in the Average Handling Problem

The objects or results have been outlined very briefly which should be considered in analyzing the handling problem in the machine shop. These problems should be considered from the standpoint of the various number of moves which must in general be made, and which are roughly eight in number.

First is obviously the handling of incoming stock or material in the receiving department, together with its storage until such time as it is started through the production program.

The second movement is the delivery of the raw material to the first of the machine operators. Next is the movement from machine to machine, and in general it may be stated that this movement from machine to machine is the one which deserves rather more study than it has received in general up to this time. There should also be considered the inter-departmental movement or the movement of parts from one battery of operations to the next. After the machine operations are completed, the material is then moved to storage, assembly or shipment. Also must be considered, and it is frequently a very important item, the disposal of scrap which results from the machine operations, which disposal is not always a simple or easy problem. In some plants there are other operations to be considered, which are not truly machine operations, but which frequently are of necessity a part of the machine shop. Such operations are assembly, painting, inspecting, plating and the like.

Subdivisions of Types of Handling Equipment

The various types of handling equipment which are available can be divided roughly into two classes —intermittent operation and continuous operation, or in two other classes—fixed path and flexible path, with subdivision of semi-flexible path.

The most inexpensive and the most commonly used apparatus is undoubtedly that which would come under the head of intermittent operation and flexible path, namely, the shop truck or one of its modifications. The shop truck may be hand-pushed or may be hooked up to a tractor and run in a trailer train. Or the wheels can be taken off the truck and a skid platform made of it, and this platform used in connection with a hand-lift truck or an elec-

tric-lift truck. The platform can also be used as a base for special racks of various forms designed for the particular parts to be moved. A still further modification is the special-purpose electric truck, many varieties of which have been produced within the last few years. These include cranes, elevator platforms, shovels, grabs and many other special modifications. This type of apparatus is, of course, familiar to all and occupies a very important part in any handling equipment. It is hard to conceive of any machine shop which would have no place for at least some type of floor-operated wheel vehicle.

A second type of intermittent operating apparatus, but with a fixed path, is the overhead hoist, either stationary or on a monorail system, a form of handling apparatus which has a very wide and extensive use. The hoist, when installed on a monorail, can follow only a fixed path, and in general handle material only directly in line with this fixed path. The overhead crane, however, will cover a wide area, but still a fixed area. The bridge crane can be coupled up with a monorail system, so that the hoist can be used on the bridge beam, and run from it on to the monorail system, thereby combining the advantages of the two types of equipment, that is area coverage and line operation.

Conveyors Classified as Continuous-Operation Apparatus

The question of continuous operation comes next, and here one gets into the more newly developed and less well understood apparatus, the conveyor. The simplest form of conveyor is undoubtedly the gravity roll, which will be classed under the head of continuous operation, although the flow of packages may be continuous or intermittent. However, it is not necessary for the conveyor to be moved from the final delivery point back to the starting point in order to take a new load, and for this reason it is considered as continuous. The uses of gravity roll are numerous and it should by no means be neglected in any study of handling methods. Its use is, however, limited to articles which can properly operate over the rollers, and except where power is applied to the rolls, by one means or another, it must have a certain definite slope, in order to carry material automatically from one point to another.

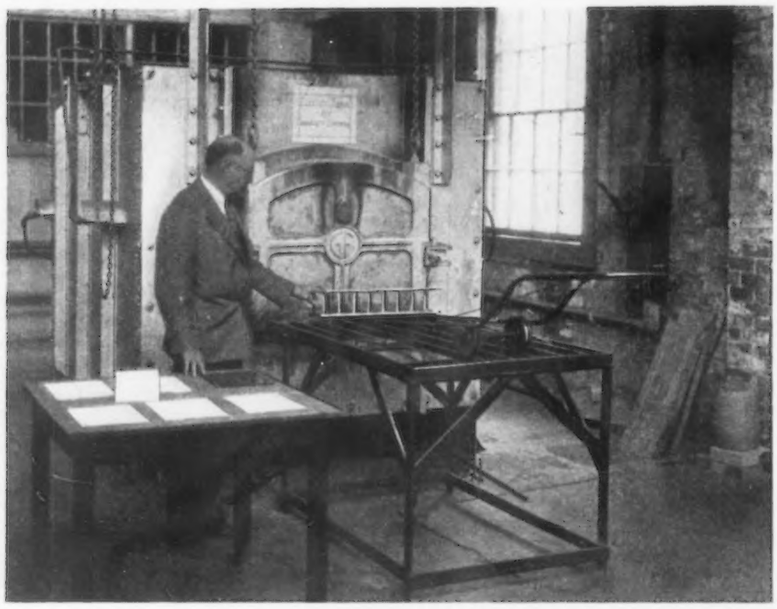
The next type of conveyor to be considered is the belt slat or pan conveyor, which is essentially nothing but a moving platform, operated by a power drive. In general this type of apparatus must operate in a straight line, although it can run up or down an incline. If corners are to be turned, a break in the conveyor must occur, and provision be made for feeding from the head or delivery end of one section on to the tail end of the next following section. Within its limits, however, this type of apparatus has a very considerable use and is frequently extremely valuable in solving particular problems.

Probably the most flexible type of conveyor apparatus is the overhead power-driven trolley conveyor, which is in a sense a continuous-operating monorail system. This type of conveyor can be run up or down, and turned in any direction in a horizontal plane. It can carry material on hooks of special design from small light articles up to heavy and bulky pieces. It can be carried close to the ceiling, clearing floors and aisles, and then brought down to the proper height for loading and unloading. It can be run at any desired speed from a matter of a few inches up to 75 ft. per min. and more. It can be used in short lengths for serving a battery of machine tools or can be run several thousand feet from one department to another or from one building to another, furnishing continuous transportation. A modification of the overhead-trolley conveyor is also available, consisting of a double-track system with free trolleys operating on a secondary track, so arranged as to be pushed by the power conveyor, the secondary tracks being equipped with

(*Concluded on page* 1858)

THE slat conveyor is one member of the large conveyor family. The one shown here is handling Majestic radios at the car loading platform.

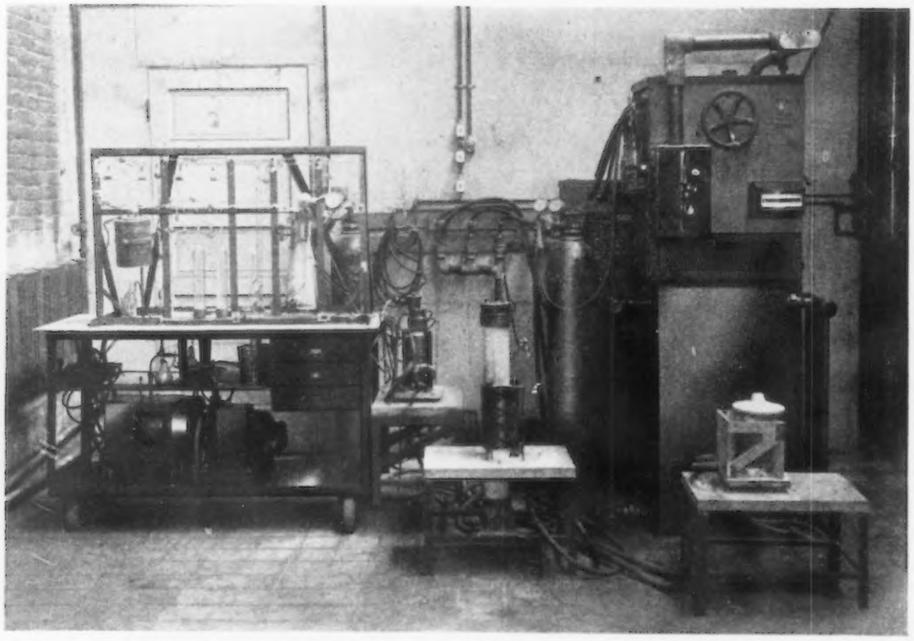
Photograph, courtesy Webster & Weller Mfg. Co., Chicago.



Some of the Armco Research Equipment

A charge of ground coated enameled sheets ready for firing in a large experimental furnace used for annealing and enameling purposes. (Left)

APPARATUS for calibration of optical pyrometers, through matching up the brightness of the pyrometer light against that of a standardized broad-filament lamp. (Right)



VACUUM fusion apparatus is at left, tube and coil in which metals and alloys are melted under vacuum is in center and high-frequency induction equipment at right. Coil furnace for rapid melting is in foreground.

SPECIAL RESEARCH EQUIPMENT AND HOW IT IS USED

RESEARCH is one of four major activities in the American Rolling Mill Co., ranking beside finance and accounting, sales and publicity, and production. It has been accorded this distinction since Armco's beginning in 1900. An article last week described the way in which the research division is organized, how it functions, some of its working tools, and the part it has played in Armco's growth. The present article describes and illustrates much of the special equipment used in studying the properties of metals and determining how they can be applied to best advantage.

WITH the steel-producing capacity of the country apparently exceeding present-day demands by a considerable margin, the industry is agreed that it must expend more time, effort and money than ever before in seeking new outlets for its products. The well-planned campaign of the Sheet Steel Trade Extension Division of the National Association of Flat-Rolled Steel Manufacturers is an excellent sample of what is being done collectively. On the other hand, the part which the individual company can play is admirably demonstrated by the research work of the American Rolling Mill Co., Middletown, Ohio.

Of special advantage today, when they are helping to open up new avenues of steel consumption, these research activities were inaugurated some 25 years ago. What they mean to Armco, how exhaustive is their treatment of pertinent subjects, how they form an inextricable part of Armco's life, is graphically portrayed in a permanent exhibit at Middletown. An essential and imposing part of the exhibit is the tools with which the research division works.

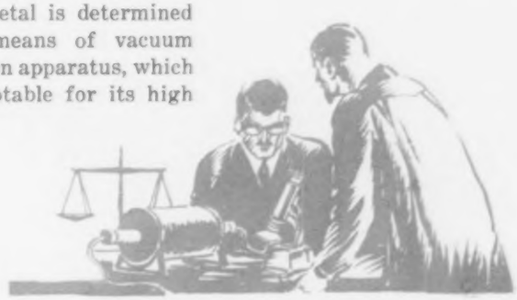
Microscopes of Great Power Used

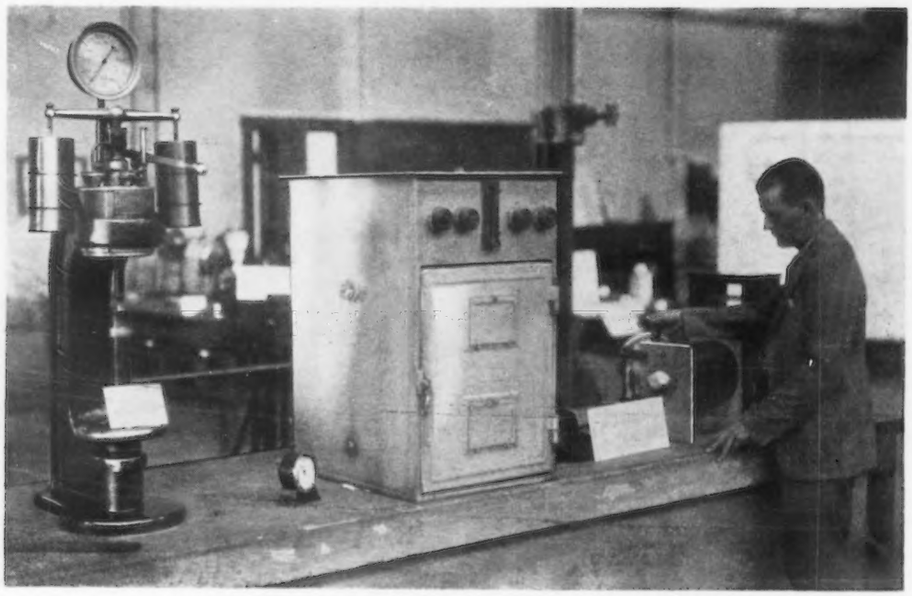
IN the metallographic laboratory the equipment consists of two large inverted metallurgical microscopes for examination of metals at magnifications of 50 to about 3000 diameters; one small inverted metallurgical microscope with a magnification range of from 50 to 1500 diameters (this instrument is used more or less as a portable microscope); one micro tessar outfit for photographing samples at low magnifications (1 to 15 diameters); and one binocular microscope with a magnification range of from 10 to 85 diameters. This binocular is for the examination of fractures. Samples submitted to microscopic scrutiny are rough ground on a rough grinding stand and then pass to a polishing table for the final polishing operation.

Of vital importance in a corrosion-resisting material, the number of phases in a sample is determined by X-ray and microscopic studies. The X-ray diffraction apparatus, manufactured by the General Electric Co., contains a water-cooled Coolidge tube with a molybdenum target. An oil-filled transformer in the base supplies the maximum current required—25 milliamperes—at a potential of about 40,000 volts.

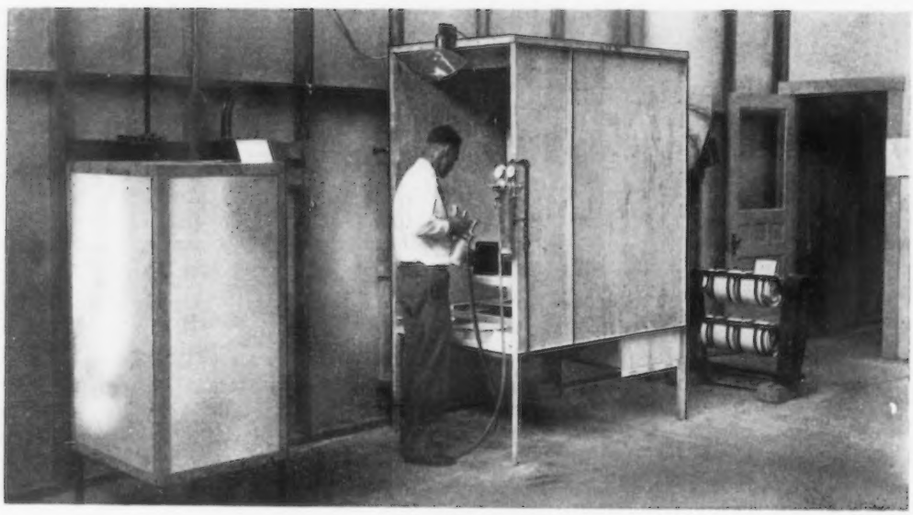
Controls for the transformer are located on a wall panel. In addition to the current stabilizer furnished with the machine, the installation includes a Keleket stabilizer, which has the advantage of having no moving parts, mounted behind the control panel. A water-pressure switch on the panel turns the tube off in case there is an interruption in cooling water pressure.

The amount of hydrogen, nitrogen and oxygen existing as impurities in metal is determined by means of vacuum fusion apparatus, which is notable for its high





SAMPLES (Left) are maintained at constant temperature in oven (center). Thermal critical points of iron, steel and alloys are determined by apparatus at right. Brinell hardness testing machine is at left.



AFTER being sprayed or dipped, enameled test pieces are dried in oven at left. Enamel is ground and mixed in ball mills behind spray booth.

SMOOTHNESS of electrical sheet steel is studied on a space factor machine. This is shown in the view at left.

METALLOGRAPHIC laboratory. Equipment includes two large and one small inverted metallurgical microscopes, a micro Tessar outfit and a binocular microscope.

degree of accuracy. Metals and alloys are melted under vacuum in a tube and coil; likewise there is a coil furnace in which they may be rapidly melted. Power is conducted to the various heating coils from high-frequency induction equipment which is located close by.

Of unusual interest is the method of calibrating optical pyrometers. A calibrated broad-filament lamp is a source of light (radiant energy) upon which the telescope for an optical pyrometer is sighted, the lamp filament of the latter being matched in brightness with that of the former. For every constant broad-filament lamp temperature there is a definite current which is measured by a shunt (at the left side of the broad-filament lamp box) and an L. P. N. type K potentiometer (before which the operator sits). The current needed to illuminate the optical pyrometer lamp filament for such matching of brightness is measured by a second standard shunt and the potentiometer, thus permitting the standardization and calibration of the optical pyrometers in question.

The broad-filament lamp originally was calibrated by means of a Bureau of Standards artificial optical pyrometer.

Extending the Use of Sheet Mill Products

IN no phase of its research program is Armco doing a more thorough job than in promoting the use of enameled sheets. Its investigations of the vitreous enameling of sheet metal are carried on in a laboratory set aside especially for that purpose. Among the equipment are dipping pans for dipping large or small experimental sheets, a smelting furnace, raw material for making an enamel (fluorspar, sodium nitrate, cobalt oxide and manganese oxide), jars for grinding, screens and pans.

Equipped with a Maxon Premix burner, the smelting furnace is used for fusing oxides to make various enamels. Large or small batches can be melted rapidly and economically for studies of the composition and preparation of enamels. In a room adjoining the laboratory is a large experimental furnace, made by the General Furnace Co., for annealing and enameling sheets. The heating units are in the form of nichrome ribbon. The interior

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FAHY Simplex permeameter and control equipment are used to measure permeability and hysteresis loss of bar or sheet samples of magnetic material. The control apparatus also measures magnetic properties on ring samples.

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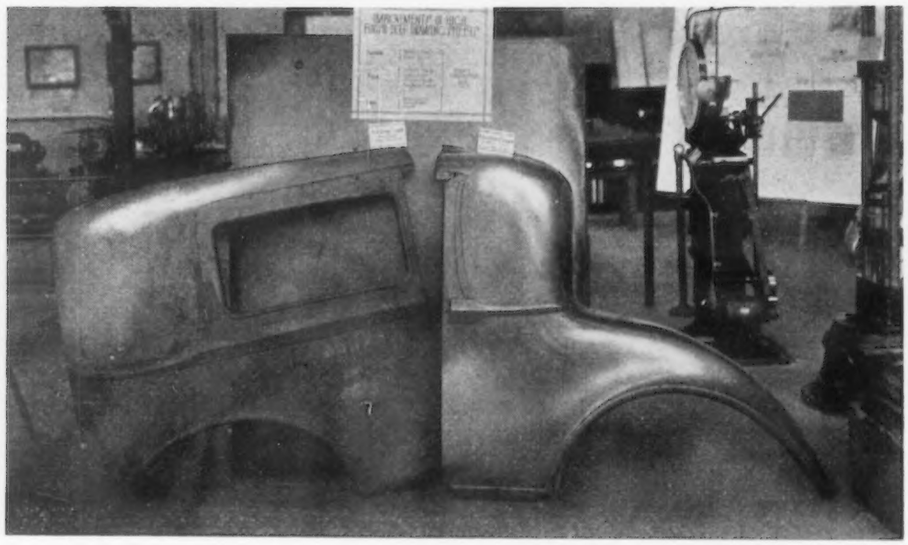

THIS exhibit illustrates to what extent complicated shapes can be formed from deep-drawing sheets in one drawing operation.

of the furnace is 30 in. wide, 68 in. deep and 27 in. high.

For drying enameled test pieces after spraying or dipping, the laboratory has an electric drying oven in which samples 18 x 24 in. can be dried. These tests are virtually equivalent to commercial production tests. Spraying equipment consists of a DeVilbiss spray booth and gun similar to those found in many enameling plants. There are two ball mills for grinding and mixing enamel.

The enamel laboratory contains several exhibits of more than passing interest. One shows the ingredients from which an enamel may be melted, the preparation of the enamel, the various processing steps and an Armco ingot iron sheet ready to be enameled. Directly above this exhibit are photographs portraying the bonding of enamel to metal.

A second exhibit is a study of the defects in enameling; a third illustrates the properties required of an enameled sheet. The metal must be able to withstand deep drawing and have a composition and surface finish which will enable it to be readily enameled. It likewise must be capable of being welded easily and spun. The factors which cause variations in these properties, as well as the control of these factors, is one of the most important problems on which Armco's research forces are constantly engaged.

Magnetic Testing and Permanent Exhibits

SOME of Armco's most intriguing research problems have been worked out in its magnetic testing laboratory, which is exceptionally well equipped. Included in the apparatus is a Fahy simplex permeameter and control equipment for measuring permeability and hysteresis loss of bar or sheet samples of magnetic materials. The control equipment also is used when measuring the same magnetic properties on ring samples. The laboratory has an Epstein tester for measuring power loss or core loss in electrical sheet steel. Power for this machine is provided by a d.c. motor and an a.c. sine-wave generator. Another unusual piece of equipment is a space factor machine for studying the smoothness of electrical sheet steel.

The permanent exhibits cover almost every phase

OXIDES to make various enamels are fused rapidly in a smelting furnace equipped with a Maxon Premix burner. Samples of enameled ingot iron products are at right.

of steel making. A series of charts sets forth the steps in the purification of the metal from the iron ore to the finished product. Neatly arranged on a table are the miscellaneous materials which are used in building an open-hearth furnace, furnace lining materials and the charged materials.

Another exhibit shows the relation of grain structures: that is, the size and shape of the crystals in the metal and the drawing properties. Still another illustrates the various steps in the development of corrosion-resistant metal—the crucible in which the metal is melted, mold into which it is poured, and the sheet bars and sheets produced from ingots. Accelerated laboratory tests form a preliminary guide, while actual service tests are a final measure of the worth of the material as a corrosion-resistant metal. Large charts demonstrate the methods employed in studying ductility.

Of uncommon interest is an exhibit of two automobile body side panels, showing to what extent complicated shapes can be formed from deep-drawing sheets in one drawing operation, which in the early days of the industry would not have been possible. With the improvement in physical properties has come a surface finish such that only three coats of lacquer are necessary. When automobiles were first built, 15 coats of paint were used.

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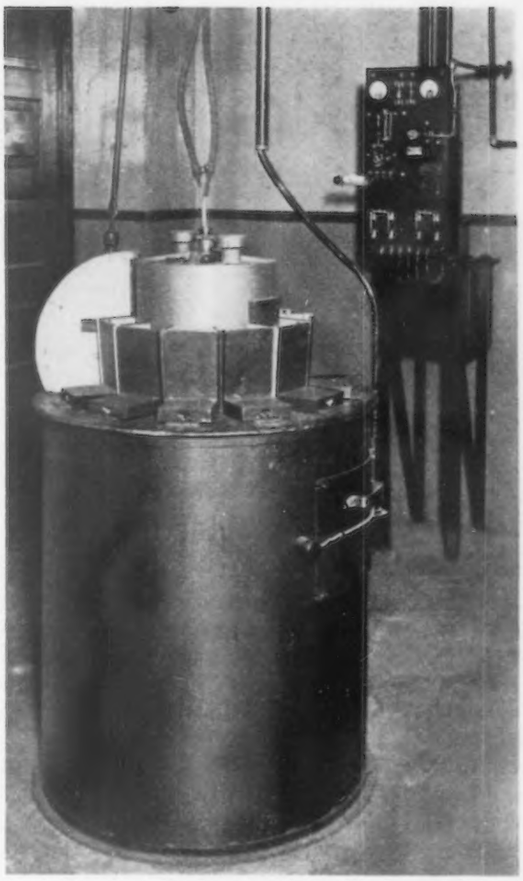
Effect of Antimony and Arsenic on Rolling Copper

EXTENSIVE investigations have recently been made in England by the Nonferrous Metals Research Association on the effects of impurities on copper. A part of the results of these investigations was presented before the spring convention of the Institute of Metals in London, England, by S. L. Archbutt and W. E. Prytherch of the National Physical Laboratory, Teddington, England. Their paper relates to the effect of antimony and the combined effect of antimony and arsenic on copper in the absence, so far as could be obtained, of oxygen and other elements.

In view of the great difficulty in removing the last traces of oxygen an upper limit of 0.02 per cent was regarded as satisfactory. In the antimony-copper series, alloys containing up to 0.85 per cent antimony have been studied, and in the arsenic-antimony-copper series up to 0.5 per cent of each impurity together.

In the former series alloys containing up to 0.47 per cent antimony withstood hot rolling and up to 0.85 per cent cold rolling from cast billets. An alloy containing 0.85 per cent antimony was hot short. In the latter series all compositions withstood rolling either hot or cold.

The investigation deals with methods of preparation and casting, rolling behavior, density, hardness, tensile properties at ordinary temperatures and at 250 deg. C., fatigue and impact properties, electrical conductivity, softening temperature of cold-worked material, and microstructure. The solubility of antimony in solid copper has been redetermined. Antimony is highly soluble in solid copper and small additions of this element to copper low in oxygen are found to improve the tensile strength at ordinary temperatures and, at 250 deg. C., the fatigue properties, and to raise the softening temperature (of cold-worked material), without impairing ductility or toughness.



X-ray diffraction apparatus contains a water-cooled Coolidge tube having a molybdenum target. Oil-filled transformer is in base and its controls are located on a wall panel.

Copper low in oxygen, containing antimony and arsenic together, appears to withstand hot rolling better than with antimony alone. The mechanical properties of copper low in oxygen are improved by small additions of antimony and arsenic together to a greater extent than by additions of either of these elements separately. The softening temperature of cold-worked material is raised. Both these impurities lower the electrical conductivity of copper, but antimony alone appears less injurious than arsenic alone.

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A HANDY volume dealing with the engineering features of various types of cranes has been put out by the Whiting Corpn., Harvey, Ill. This is a handbook of 160 pages with limp cover, which is full of half-tones and line cuts, tables and other data, dealing with overhead electric traveling cranes, gantry cranes, jib cranes of different types and bridges, trolleys, lifting attachments and other auxiliary equipment for cranes. Erection and lubrication, safety features, typical specifications, clearances and general dimensions and many other points are brought out in this handbook.

CASTING GUNS BY THE CENTRIFUGAL PROCESS

By COL. T. C. DICKSON
Commanding Officer, Ordnance Department, Watertown Arsenal, Watertown, Mass.

A LONGITUDINAL cross-section through one machine used by Watertown Arsenal for casting guns by the centrifugal process is shown in Fig. 1. The rotor is a thin-walled steel cylinder supported on four rollers, two in each end of the frame. Each top housing contains one roller held in contact with the top element of the rotor by springs to allow for expansion. Each roller is supported by roller bearings provided with forced lubrication. One end of the rotor is connected to a motor.

A core case lined with refractory, or a cast iron mold, is inserted into the rotor, and a flange on the end into which the molten steel is poured is bolted to one end of the rotor, to insure rotation of the two as a unit. The interior of the refractory lining or the hole in the chill mold has the shape, generally conical, and the size of the casting required.

The end of the mold into which the metal is poured is closed with a cylindrical plate, having a hole into which is inserted the pouring spout through which the metal passes from the pouring box into the rotating mold. The end of the mold adjacent to the motor is closed with a plug having an axial hole to permit escape of gas.

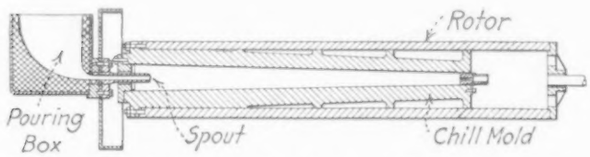


Fig. 1.—Longitudinal section through rotor, chill mold, pouring box and spout.

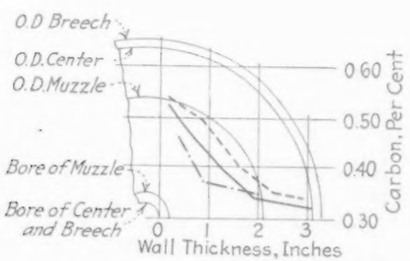


Fig. 2.—Carbon content of thin cylinders cut from centrifugal cast guns when ladle showed 0.35 per cent.

Chill Area Five Times That of Casting

For the chill mold, a single piece of cast iron is bored to the size and shape of the exterior of the gun, with proper allowance for shrinkage and machining, and the exterior surface is machined to fit closely the interior of the rotor. The relatively high speeds used require that the center of gravity of every rotating part shall be on the axis of rotation. The mold is designed to have a chill area five or more times the area of cross-section of the molten steel.

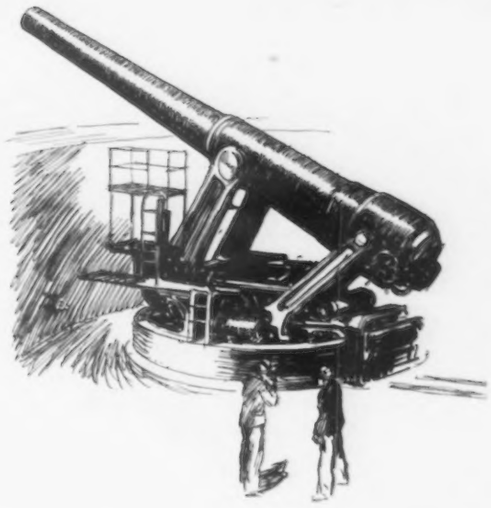
While sufficient castings have not been cast in one mold to determine the number of castings obtainable from a mold, it seems reasonable to expect about the same number as from an ingot mold. Continuous operation of a machine may require artificial cooling of the exterior of the chill mold.

Exterior and interior diameters fix the thickness of metal in the wall. For a constant angular velocity of rotation of the mold, centrifugal force varies directly with the radius of the interior cylindrical surface of the molten metal. The rate at which the molten steel enters the mold should decrease as the radius of the interior surface of the metal decreases. The rate of entrance of the molten steel into the mold depends principally on the area of cross-section of the hole in the pouring spout and on the velocity of the metal.

Operation of Centrifugal Casting

Rotor and mold are brought to the desired speed before pouring of the molten steel is commenced. The speed of rotation may be kept constant during solidification of the steel, or it may be kept constant until the steel is inserted into the mold and then gradually reduced, which may be advantageous when the thickness of the wall of the casting is relatively large. If the steel is always poured at approximately the same temperature and other conditions are about the same, the speed of rotation should be fixed by the maximum

MANY applications of thick-walled cylinders, built to withstand high internal or external pressures, are to be found in industry. The accompanying article, drawn from a paper read before the American Society for Steel Treating, shows how the making of one kind of such cylinder is successfully done, at a great saving from the former cost. It tells of the metallurgical advantages thereby obtained and shows how a certain moderate segregation in the resultant material is an actual benefit in meeting service requirements.



exterior diameter, the thickness of wall of the casting and the temperature of the mold. The highest speed of rotation with which the exterior surface of castings is free from cracks should be used.

Solidification in a centrifugal casting proceeds successively from exterior to bore. The contraction produced by solidification acts to decrease the diameters of the successive solidifying annuli while the metal is forced outward by centrifugal force. When solidification is complete, the machine is stopped and centrifugal force ceases to act. Shrinkage cavities should not be formed in the wall of a properly made centrifugal casting. The density of the metal in a centrifugal casting is slightly greater than in a forging of practically the same composition.

Results of Centrifugal Casting

Chemical analyses were made of thin cylinders, having different radii, cut from the breech, middle and muzzle of a gun cast centrifugally in a chill mold. The percentage content of each element was plotted as ordinates and the distance from the axis of rotation as abscissae. Fig. 2 shows that the carbon content increases appreciably from the exterior toward the bore. There is a slight increase in manganese toward the bore; the increase in molybdenum is approximately the same. The silicon content is fairly uniform. There is an increase in the phosphorus and sulphur contents toward the bore, but the maximum is well within the permissible limits.

The higher carbon content at the bore of a centrifugal casting makes the proportional limit of the steel appreciably greater at the bore than at the exterior surface. The stresses produced in a gun by the powder pressure are a maximum at the bore and decrease rapidly to the exterior. The segregation of carbon toward the bore, caused by the centrifugal process, makes the latter ideal for gun making.

Experience indicates that centrifugal castings can be cold-worked to twice the percentage of enlargement of the bore diameter permissible with forgings.

The only discard required from a centrifugal casting is an annular volume adjacent to the bore which contains slag, gas and other non-metallic inclusions, and which is less than must be removed from a solid forging, and an annular volume adjacent to the exterior surface which may contain slag, cold shuts and shallow cracks. This latter volume does not appreciably exceed the volume that must be removed from the exterior of a rough forging.

A radial thickness of about ¾ in. removes all undesirable metal adjacent to the bore. For exterior diameters of about 7 in., a radial thickness about ½ in., and for exterior diameters of about 4 in. a radial thickness of about ¼ in. have proved sufficient to remove roughness, slag, cold shuts and cracks from centrifugal castings.

Greater Speed in Production

A mobile gun can be cast centrifugally in one piece in less time than an ingot for either a tube or a jacket can be poured, cooled sufficiently and stripped from the mold. The centrifugal casting is removed from the machine immediately after all metal has solidified and when at a temperature above the critical point. It should be inserted at once into a normalizing furnace, to utilize the heat in the casting. The centrifugal process eliminates the operations of heating the ingot for forging and of forging, saves the discard of at least 35 per cent of the weight of each ingot, and reduces the amount of metal to be bored out.

Prior to the development by Watertown Arsenal of the cold working process, each gun was made by assembling by shrinkage two or more layers of accurately bored and turned forgings. The cold working process enables guns to be made in one piece, exclusive of breech ring and breech mechanism, except that high-velocity guns are made with a removable liner. Exclusive of breech ring and breech mechanism, guns can be cast centrifugally and cold-worked in about one-third of the time and at about two-thirds of the cost of the ingot-forging-built-up method. This marked reduction in time should prove valuable in an emergency.

Sufficient guns have been cast centrifugally in one

piece to establish that the quantity of molten steel required to make one gun by the ingot-forging-built-up method will make from two to three guns of the same size and type by the centrifugally cast cold-worked one-piece process. These two latter processes conserve natural resources.

While developing the centrifugal process, several different compositions of steel were tried. The following is now uniformly used: 0.35 to 0.45 per cent carbon, 0.60 to 0.70 per cent manganese, 0.30 per cent molybdenum and 0.05 per cent vanadium.

Advantages of Centrifugal Gun Castings

Metallurgical—

1. Segregation of carbon, which makes the proportional limit of the steel greatest at the bore, where the stress is a maximum.

2. Higher tangential tensile and Charpy properties for the same composition.

3. Initial compression of metal adjacent to the bore.

4. Steel is slightly denser, showing that gas, slag and non-metallic inclusions are carried by centrifugal force into the bore or into the metal, adjacent to the bore, that is removed.

5. Pipe and shrinkage cavities inherent in ingots eliminated.

6. Can be cold-worked to about twice the bore enlargement permissible with forgings, which enables the weight of the gun to be reduced and retain the same strength.

Economic—

7. Discard of at least 35 per cent of the weight of each ingot eliminated.

8. Operations of heating for forging and of forging eliminated.

9. Less than half of the quantity of raw materials required to make the same number and kind of guns.

10. Less amount of plant and equipment required to meet war requirements.

11. Time of production greatly shortened.

12. Cost of manufacture reduced.

Discussion on Guns Cast Centrifugally

ANSWERING a question as to whether a practical limit exists on the length of mold which can be filled by the flow from the centrifugal process, before the steel becomes too viscous, Colonel Dickson said that this problem may easily be met by pouring from both ends. So far he has been making mostly 3-in. guns or thereabouts, but with a few running up to 6-in. (bore). He expressed the view, however, that a 16-in. gun weighing over 100 tons will be found amenable to this sort of treatment as we progress further in our knowledge of the process and our ability to handle the larger weights.

Whether the induction furnace produces steel as clean as that from the arc furnace was answered by the statement that a great many castings were lost from bad steel when an arc furnace was used at the start of this process. The metal was too cold. Some high-frequency induction crucible furnaces were obtained and the trouble was eliminated.

One machine makes two guns an hour, which means that the furnaces must produce a heat every half-hour. They are so located with respect to the casting machine as to dispense with the use of a ladle. There is as little brickwork as possible used in the runners. The entire charge is placed in the furnace, without any subsequent additions. Such slag as gets into the casting equipment (shown in one lantern slide) is that from the top of the metal in the furnace, and should be excluded.

Slag Inclusion Limited to Area Removed in Machining

However, as the centrifugal force starts at from 110 to 120 lb. to the sq. in., and carries the heavy material to the outside surface, there is really no harm if the slag does get in, because it inevitably remains in the inner, porous layer, which is machined out anyway and forms no part of the gun. Of course, the centrifugal force diminishes as the mold gradually fills up, varying directly with the diameter existing at any instant.

For a 3-in. gun the hole left in the center of the casting is about 1½ in. This is cleaned up mechanically to 2½ in., and then hydraulic pressure applied to expand the bore, cold, to the final diameter. This expansion, which is of the order of perhaps 12 per cent, does open up the pores to a corrosion effect. But inasmuch as the gun is made with one-third the time and cost of previous methods, this makes little difference in the final result.

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Rolling Alloys of Copper and Phosphorus

RESULTS of rolling experiments on alloys of copper with 2 to 6 per cent phosphorus, with and without the addition of 5, 10 or 15 per cent manganese or nickel, were discussed in a paper before the spring meeting in London, England, of the Institute of Metals, by Owen W. Ellis, director of metallurgical research, Ontario Research Foundation, Toronto, Canada. The title of the paper was "The Rolling of Alloys of Copper and Phosphorus Containing Up to 5 Per Cent of Phosphorus."

The plain phosphorus-copper alloys can all be successfully hot-rolled at 450 to 650 deg. C. to produce strip 0.021 in. thick, provided only small reductions of thickness are made at each stage of the rolling. In this way the copper-copper phosphide eutectic structure is thoroughly broken up and the strip can then be cold-rolled to 0.015 in. Strip, 0.018 in. thick and 1.2 in. wide, made by hot-rolling the 5 per cent phosphorus alloy at 450 deg. C., has a tensile strength of 88,000 lb. per sq. in. and is suitable for use as a high melting point solder for the electrical industry. Addition of manganese or nickel to the alloy renders it harder and much more brittle in the hot-rolling process.

USE OF ELECTRICITY IN THE STEEL INDUSTRY

By G. E. STOLTZ
Manager, Industrial Engineering, Westinghouse Electric & Mfg. Co.

ADVANTAGES of electric drive of mills are not confined to power savings. Control is made thereby much easier and difficult speed and draft adjustments brought within the sphere of semi-automatic operation. How this has been developed is brought out in Mr. Stoltz's paper, presented before the Western Metal Congress, San Francisco, February, of which the greater portion is here reproduced.

INTRODUCTION of new or more economical methods of production can be effected by only two means. One is to increase the unit output for a given investment and the other is to reduce labor cost per unit. The cost of an investment is usually assumed to be 15 per cent. This includes the cost of raising money, obsolescence, taxes and insurance on the property or machinery. On this basis an investment in labor-saving machinery of $6,667 can be made to obtain an annual reduction in labor cost of $1,000.

Response of Steel Industry to Post-War Conditions

We believe the steel industry has been alert to these new conditions. The composite price of steel products has been subject to a gradual decline since 1922. There have been no artificial or abrupt changes during that period. Apparently the industry has recognized this problem and met it in a responsive and effective manner.

One of the most spectacular changes from a labor point of view is in the production of wrought iron. One company is now in production with a method of manufacturing wrought iron consisting in pouring molten iron into a ladle containing molten slag. In 3 min. an ingot weighing 6000 lb. is produced by a few men, which would require 20 men 2 hr. by the old method. This new method not only releases men to newer industries, but enables those remaining to extend their period of useful service and to turn out this product with much less effort than was required before.

Electrification in the Steel Industry

Up to 1921 the steel industry had been accepting electrification, but not so wholeheartedly as now. It was established that auxiliaries should be driven by motors, but many questioned whether motors should be used on main-roll drives. There was considerable argument before 1921 between the steam advocates and those in favor of electric drive. But when the steel industry was definitely confronted with a steady decline in prices many large engines were replaced by electric drive to effect greater economy. Fig. 1 indicates the horsepower capacity of main roll drive installed in this country from year to year since 1905.

About ten years ago a report was prepared for executives of a number of companies, who were considering merging. At that time an electrified plant was given credit over a steam-driven plant of $2.50 for each ton of product. At present this difference is greater, but this figure, applied to the normal output of steel, would effect a saving of $125,000,000 a

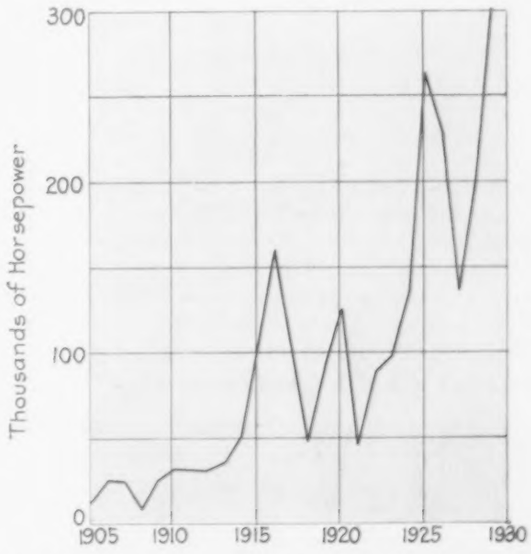

Fig. 1. Horsepower of main-roll mill drives installed year by year for 25 years.

year. If all our industries were to make such contributions as this, a surplus would be made available which would support the automobile, radio and other recent industries, without the present curtailment of business activity.

The use of electricity in mills has gone further than merely replacing engines to effect economy in driving a mill. The design of mills has been revolutionized, in some instances comparatively good equipment being made obsolete. Some who have not followed the opportunities offered by electrification have had to face severe financial conditions.

Strip Mills in the Van

One of the first products to feel the far-reaching effects of electrification was strip steel. Strip was formerly rolled in mills where the metal was passed by hand from one stand to the next. The drawback of this type of mill was not only that it required a great amount of hard labor, but that the thin metal traveling along the cold floor would rapidly lose its temperature.

Obviously a better method of rolling this product would be to pass it through a tandem mill, where the metal would go directly from one stand to another, requiring no handling labor, and would be quickly finished without great loss of temperature. The tandem mill arrangement not only reduced the amount of power required to roll the steel, but enabled the same slab to be finished to a thinner gage. Figs. 2 and 3 illustrate the old design of mill and the new.

This newer type of tandem mill, of course, was impossible as long as steam engines were used. It is necessary to have individual units, driving each stand, which can be adjusted in speed to accommodate different drafts in individual stands. After this adjustment is made it is necessary that the driving unit maintain its speed, whether the load be light or heavy. This can be accomplished only by motor drive with range in speed to enable the mill to roll

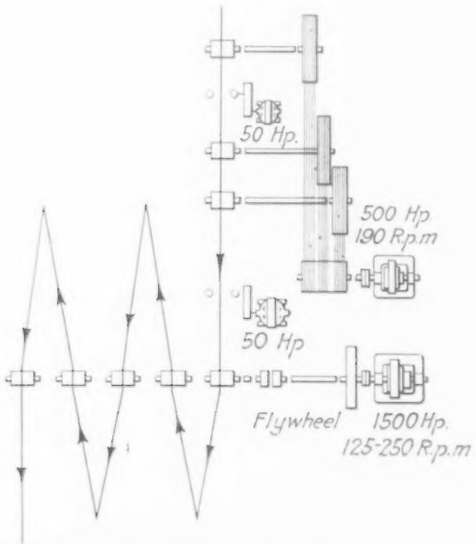

Fig. 2. Old-type 14-in. strip mill required hand transfer between finishing stands.

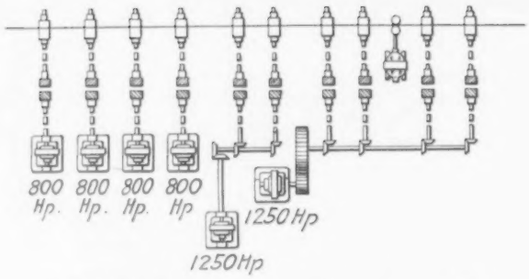

Fig. 3. Modern 14-in. continuous strip mill.

large or small material, usually the heavy at low speeds and the light material at higher speeds. But, regardless of the speed adjustment, this type of motor gives a flat speed curve with any load within its capacity.

Ability to obtain these definite characteristics with electric drive radically changed the method of producing strip, and made previous mills obsolete and practically uneconomical, except possibly for small jobbing orders. The electric method of driving these mills has advanced to a point where the mere question of power economy between motor drive and steam drive is of minor importance.

Sheet Mills Go Continuous

Strip usually covers a range from 3 in. to 20 in. in width, while sheet widths vary from 30 in. to 60 in. These limits are not necessarily fixed, but this in general is the range of the two products. Since this continuous type of individual motor-driven mill had proved so successful on strip mills, it was only natural that the next step should be made in connection with heavy sheets.

Production of heavy sheets is thus being drastically changed. The transition has not reached that same conclusive state as in strip, and only the heavier sheets are being rolled on this type of mill. But in time the present limitations may be overcome, and it is possible that in the near future continuous rolling of sheets will be almost as complete as the continuous production of strip. Fig. 4 illustrates the new type of sheet mill.

The old type of mill consisted of one stand (sometimes two) where the metal was handled by hand, often as many as eight men being in each crew. Several of these individual mills, consisting of one or two stands, were placed in a long line and driven by either an engine or a motor. The new mill requires much less labor per ton, but is limited in the gage that can be produced, owing to the fact that the metal is not rolled in packs.

Plate Mills Coming Into Line

We are now witnessing the first installation of a continuous plate mill. The use of a specially designed motor for flat speed regulation has gone from strip to sheet mills, and now is invading the plate-mill field. Sheared plate is usually rolled on three-high mills where the metal is passed back and forth. Fig. 5 illustrates the newer type of mill.

This newer mill is being installed to roll plates up to 90 in. in width. In general the old type of

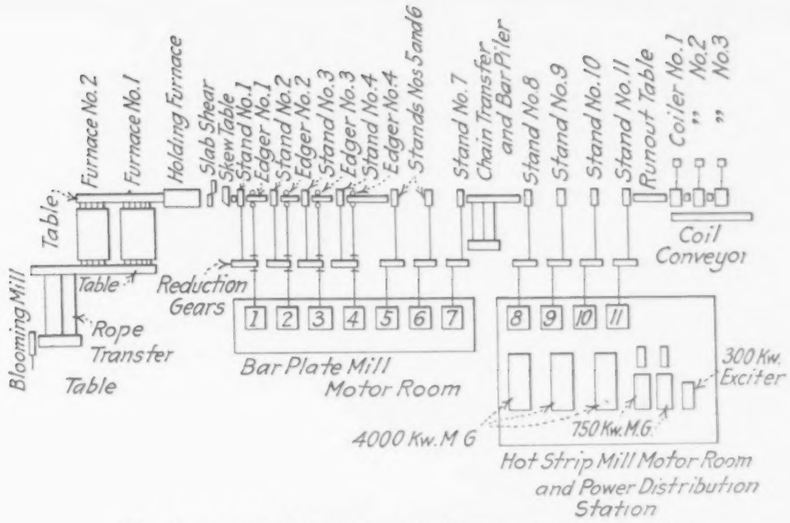

Fig. 4. Layout of a modern continuous wide-sheet mill.

mill could produce 10,000 to 15,000 tons a month. The new mill will be capable of producing 50,000 to 75,000 tons a month.

Electrification, while modifying processes of rolling, has at the same time been instrumental in placing production in the hands of large units. The best economy in these large mills is obtained when rolling large orders. The larger steel corporations can do this, as they can distribute their orders over a large number of mills. The smaller organization usually is required to roll a large number of small orders on the same mill. This, of course, in itself is uneconomical, more so now that these large-tonnage mills are possible.

Structural Mills for Wide-Flange Beams

For a number of years an installation of steam-engine-driven mills has produced wide-flange sections, but the large bulk of structural material consists of ordinary I-beams and channels rolled in grooved rolls. Recently there have been new wide-flange mills installed with motor drive. These mills have had incorporated a number of new features, but there were one or two important electrical problems to be solved if the maximum were to be obtained from them. (The roll arrangement of a mill of this type was described in THE IRON AGE of May 17, 1928, page 1380, which includes a pair of horizontal main rolls directly driven from a 7000-hp. motor.)

These horizontal rolls are used on the web and inside of the flange of the beam. In the housing with these rolls are two vertical rolls to reduce the outside of the flanges. Twelve feet from the center line of this housing is a set of auxiliary horizontal rolls to reduce the edges of the flanges. These edging rolls are driven by a 2000-hp. motor.

It is essential that these two motors carry their load and remain in synchronism at all times. This is necessary whether the load on the 7000-hp. motor be heavy while that on the 2000-hp. unit is light, or the reverse. With the metal coming through the mill in one direction, it is necessary to change the speed relation between these two motors for every different draft that may be taken on the metal. This is illustrated by Fig. 6.

Adjusting Roll Speeds to Conditions

At the top of this figure is shown the method of arriving at relative speeds between the 7000 and 2000-hp. motors with a 10 per cent reduction in the main horizontal rolls. For the sake of argument any draft taken by the auxiliary rolls is neglected. The main horizontal rolls are assumed to be revolving at 50 r.p.m.

In the upper left portion of this figure the metal is shown traveling from the auxiliary rolls to the horizontal rolls. In order that there will be no stretching of the metal, or accumulation, between the two sets of rolls, the 2000-hp. auxiliary motor must drive the auxiliary rolls at a speed of 75 r.p.m., which corresponds with a peripheral speed of 590 ft. a minute. The incoming speed of the metal to the horizontal rolls in this instance must be 90 per cent of its delivery speed.

With the same 10 per cent draft, but with the metal returning through the rolls, first through the main rolls and then through the auxiliary rolls, both sets of rolls will have the same peripheral velocity, so that the 2000-hp. motor must drive the auxiliary rolls at a speed of 83 1/3 r.p.m.

At the lower part of this figure are shown the speeds necessary on the auxiliary rolls when the draft in the horizontal main rolls is 20 per cent. Again at the left the metal is entering the auxiliary rolls first.

With a draft of 20 per cent in the horizontal rolls the peripheral speed of the small rolls must be 80 per cent of that of the main rolls, so that the 2000-hp. motor must have its field adjusted to drive the auxiliary rolls at 67 r.p.m. during this pass.

At the right the same reduction is taken in

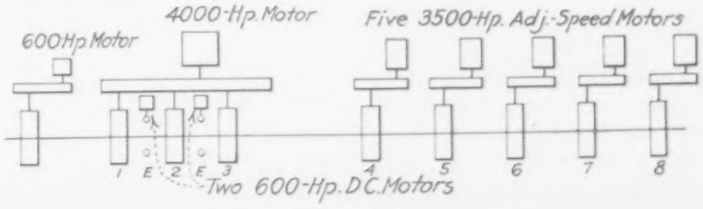

Fig. 5. Layout of a modern 96-in. continuous plate mill.

the horizontal rolls, but the metal is traveling in the reverse direction. On this return pass the 2000-hp. motor must be adjusted to drive the auxiliary rolls at 83 1/3 r.p.m.

Some Problems Encountered

In general these horizontal drafts vary from 3 per cent to 30 per cent, and are likely to be any value within this range, so that it is necessary that these drafts be predetermined. In the short period of time between passes the field (and hence the speed) of the 2000-hp. motor must be adjusted to accommodate the particular draft to be taken. This represented one of the difficult problems in the design of the electrical equipment for this mill. It required not only a careful design of control, but a particularly designed motor.

The other problem was the proper setting of the three sets of rolls as the metal was being reduced progressively from a beam blank to a finished beam. It could be imagined that, if heavy drafts were taken in the vertical rolls during the early passes, while most of the work to be done by the main horizontal rolls was delayed to the last few finishing passes, there would be considerable distortion and unnecessary strain set up in the metal.

With three sets of rolls to be set after each pass, it was inconceivable that two men would properly reproduce the drafts as each piece of metal came through the mill. Unless drafts could be predetermined, it would be impossible to pre-set the speed of the 2000-hp. motor.

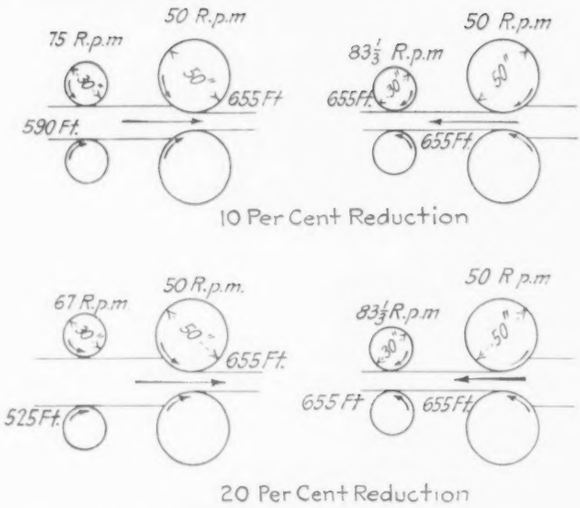

Fig. 6. 52-in. structural mill speed relations for 10 per cent and 20 per cent drafts and for both directions of operation.

For this reason arrangements were made to operate the screwdown automatically on the three sets of rolls for each individual pass, at the same time the field of the 2000-hp. motor is adjusted for its correct speed. This automatic setting of the rolls for each individual pass (see illustration, page 1383, THE IRON AGE, May 17, 1928) was the second distinct contribution electrification made to the success of this mill.

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Use of Electric Hoists in Machine Tool Plants

THERE have been trends in the machine tool industry that are materially affecting the use of electric hoists, and in much greater numbers than in certain other industries, according to a paper read before the American Society of Mechanical Engineers, at Cleveland, April 14, by Henry J. Fuller, materials-handling engineer, Stamford, Conn.

In the machine tool industry the upkeep and operation of electric hoists is not so much of a mystery, because most machine tool builders are motorizing their own equipment to a large extent. Not only are about 75 per cent of the machine tools now made fully equipped with motors for operation, but their builders are motorizing the tools in their own plants.

There has been a noticeable amount of this motorizing done during the recent slack period, and it has had a healthy effect upon the possible application of electric hoists to the machine tool industry.

Motorizing of the machine tools used by the machine-tool manufacturers has given more headroom, and made possible the servicing of several tools by one electric hoist, whereas previously short sections of track and hand blocks were necessary to lift the work to the tool or away from it.

Consideration of the operators is often taken into account in determining the use of an electric hoist or hand block, as much as is the weight of the load or the speed required. In many cases electric hoists have been put over machine tools because the operator of the modern machine tool becomes an expert and high-priced man, whose hands, like those of an artist in other fields, have to be considered. The modern push-button type of electric hoist is a great advance over the hand-operated chain block. These secondary considerations often determine the application of electric hoists.

In servicing many types of tools in the machine tool branch, speed is important. Where production becomes a steady item, many modern machine tool plants have an established policy of shifting from hand blocks to electric hoists just as soon as their production justifies it. One of the trends in the machine tool industry that adds to the use of electric hoists is an increased weight of machine tool, partly due to the addition of electric motors, and partly due to the more automatic operation of modern machine tools.

Motorizing of machine tools makes it possible to rearrange the tools themselves in connection with their being serviced by overhead equipment. This arrangement adds to the already growing popularity of electric hoists.

PRESENT AND FUTURE OF NITRIDING APPRAISED

By DR. MARCUS A. GROSSMANN
Vice-President, Republic Research Corpn., Massillon, Ohio

WHEN a material has a meteoric rise in industry, there is naturally a very rapid accumulation of data on its behavior. This has been especially true in the case of Nitralloy, as attested also by the very large number of papers published on this subject in the last two or three years.

In the face of such a mass of data, it seems useful from time to time to appraise the developments, such an appraisal to offer not only a guess on the probable value of the developments which have proved useful, but to acknowledge also, with as good grace as possible, certain failures in development.

A summary of this kind was presented two years ago by Dr. Adolph Fry, at the symposium on nitriding conducted by the American Society for Steel Treating, reviewing the state of the art at that time. Dr. Fry's authoritative position in Nitralloy invention and development bids us take up anew the points raised by him before continuing with factors which have arisen since his discussion.

Early Claims Discussed

Accepting his classification, and discussing the points in their order, we may record our present views as follows:

1.—*"The nitriding process, if handled properly, gives surface hardness with practically no distortion."*

This remains substantially true, the only possible distortion occurring if the pieces are supported improperly while at temperature during nitriding, except in certain instances noted below. Because of misunderstandings which have arisen, it should be mentioned that the term distortion is restricted to its proper sense of change of shape, and one finds usually no change of shape in nitriding. There is, however, a very slight increase in size, commonly termed growth, which is usually negligible, but which in specific cases must be taken into account.

In a one-inch ring, for example, the one-inch dimension may increase by 0.002 or 0.003 in. The amount of growth is of the order of 0.001 to 0.002 in. per in. at the usual nitriding temperatures, but is greater when the nitriding temperature is higher. This is an additional reason for avoiding high nitriding temperatures in the initial stages. This same growth may also in certain cases cause distortion. Obviously, if a thin sheet is nitrided and is protected on one side from nitriding (as by tinning), the unprotected side will nitride and grow, causing the sheet to curl. Similarly, pieces of complicated shape with marked differences in cross-section may suffer distortion from similar causes.

Core Not Changed by Nitriding

2.—*"The physical properties of the core are not changed by nitriding."*

Present practice in nitriding steels is to give the hot-rolled steel a preliminary heat treatment, consisting in quenching or air-cooling from above the critical temperature, say from 1700 to 1750 deg. F. (925 to 950 deg. C.), and then to reheat to some temperature which is above the temperature of nitriding.

Obviously, if the reheating or tempering is done at 1300 deg. F., a subsequent nitriding at 950 deg. F. is not likely to affect further the core properties. However, a useful second nitriding stage at 1150 to 1200 deg. F. is often practiced to advantage after the 950 deg. F. nitriding, in which case the preliminary tempering before nitriding should be governed accordingly.

3.—*"The hardness and wear resistance are higher than those of any other steel-treating process."*
This statement still holds.

4.—*"The hardness is not injured by tempering temperatures even above 950 deg. F. (510 deg. C.)."*
This presumably refers to a reheating after the nitriding, and has reference to the hardness at room temperature after cooling down from the tempering temperature. The statement holds for temperatures of at least several hundred degrees above the nitriding temperature of 950 deg. F. (510 deg. C.). The time at such elevated temperature must not, however, be extended inordinately. It should be emphasized that this refers only to the properties of the hardened case, when surface effects are carefully avoided.

Thus a nitrided sample might be immersed in lead at 1400 deg. F. for half a minute and then be cooled quickly to room temperature, and the case would preserve practically its original hardness. If, on the other hand, the same sample were heated in air for a few minutes at the same temperature, causing scaling and oxidation effects, the hardness at the scaled oxidized extreme surface would drop off materially. Full hardness would be found, however, after the affected surface had been removed, provided the original case had sufficient depth.

Hardened Parts Free of Stresses

5.—*"Nitrided parts are free of internal stresses and therefore free from aging effects."*

In amplifying this statement to present more

clearly our own views, we should like to draw attention to two factors in it. First, the quenching stresses are present in hard quench-hardened steels, because they arise in the necessary quench and because a tempering temperature which would dissipate the stresses would reduce the hardness, whereas the slow cooling which follows the nitriding leaves substantially no stresses. Second, the temperature at which nitriding proceeds is so far above room temperature that even indefinitely long periods of time at room temperature induce no aging of the hard nitride structure. Conceivably a change could develop, especially if the proper nitriding temperature happened to be lower than it is, but the facts are that no such change develops.

In regard to aging effects, it is perhaps proper at this point to mention temper brittleness, which was sometimes, but not always, encountered when nickel was used in the alloy. This temper brittleness, which develops on cooling from the nitriding, is a phenomenon whose nature is not yet well understood and although it is often found when nickel is present, it does not necessarily or universally accompany it.

6.—"*Nitrided parts are rust-resisting to a certain extent.*"

To take full advantage of the rust resistance, which is often present, it is advisable to use the original nitrided surface wherever possible and to do no grinding after nitriding.

Selecting the Proper Steel for Nitriding

7.—"*The process may be adapted to various requirements . . . by selecting a nitriding steel of the proper composition for each purpose.*"

It should be observed that, whereas Fry's illustration of this point shows differences in the hardness and depth of nitrided case, the present search for improvement in the United States finds itself more concerned with the core. In most applications, a case hardness well above 800 Vickers is obtained and is adequate. That is, the steels which have been adopted as tentative standards are of such composition that they give hardness of at least 800 to 900 Vickers, and if greater depth of case is desired, it is secured by extending the time of nitriding or by using a duplex cycle with a higher nitriding temperature toward the end of the run.

On the other hand, among the compositions now considered standard, we find the choice of a steel to be governed by such factors as strength of core, or ductility and machinability before nitriding. One important factor is the ease with which the steel can be formed cold and for such purposes the lower carbon grades (around 0.10 to 0.20 per cent carbon) are used. These lower carbon grades are also usually more easily machinable. Where higher core strength is desired, it is often useful to use the higher carbon grades, sometimes even as high as 0.65 per cent carbon.

8.—"*The best results are obtained by quenching and tempering the raw material and then carrying out the machining and nitriding operations.*"

The quenching, or sometimes air-cooling, from a temperature well above the critical point, *i. e.*, from say 1725 deg. F., gives a uniform structure, free of any large areas of ferrite. As a result, the subsequent nitrided layer is much more uniform and tougher. Areas of ferrite are undesirable because they lead to the formation of brittle spots. Indeed, in areas containing free ferrite it is often possible even to detect nitride needles.

9.—"*Various nitriding agents have been tested.*"

At the present time, practically all nitriding is done in ammonia. A suggestion has been made by Kinzel and Egan regarding the use of molten cyanides, which give a hard but extremely thin case. Circulating ammonia gas is the almost universal present-day nitriding agent.

10.—"*The use of a fan causes circulation and will help to give uniform nitriding.*"

This process was found to overcome the lack of uniformity in different pieces in the same nitriding box.

Points to Be Avoided

11.—"*The following should be avoided: Surface oxidation, foreign metals touching the steel, foreign materials in the ammonia.*"

Surface oxidation, especially decarburization, has been shown to result in a very brittle (almost friable) case. It should be emphasized that this matter of surface oxidation is one of the most serious causes of failures encountered in present-day nitriding practice. The statement has been made that the presence of decarburized, oxidized surfaces before nitriding leads to more failures of nitrided parts than any other single cause. These defective cases are very brittle and result in early spalling of the piece in service. Foreign metals susceptible to nitriding sometimes have an unexpected effect in retarding nitriding, and this is equally true of the nitriding containers themselves, as will be discussed later. Foreign materials in the ammonia, such as benzol, have at times been used in an attempt to minimize decarburization.

Fry's statement that "we do not as yet have a complete and well substantiated explanation for the hardness obtained by nitriding" must still be acquiesced in. First, it should be pointed out that there is as yet no clearly established relationship between the iron-nitrogen equilibrium diagram and the structures and hardness obtained in nitriding. It is true that certain undesirable structures (e.g., braunite) are obtained when certain temperatures are exceeded, and these temperatures correspond with lines in the iron-nitrogen diagram. But it is further true that properties which are helpful are also obtained under certain circumstances by heat treatments in the same ranges, as in the toughening treatment after nitriding.

Furthermore, the temperature at which most nitriding is carried out, 950 deg. F. (510 deg. C.), corresponds merely with a region of moderate solubility of nitrogen in iron. There is at present no correlation of heat treatment with "critical points" in nitriding, as is well established in the iron-carbon equilibrium diagram.

A plausible mechanism of nitrogen hardening would seem to involve the following: A "splitting-off" of the nitrogen atoms from the ammonia at the surface of the metal, a diffusion of the nitrogen into the surface layers, still as atomic nitrogen, and an association of the nitrogen atoms with aluminum atoms in the steel to form stable and practically non-diffusible aluminum-nitrogen compounds, these

So rapid have been developments in the use of nitriding that a presentation of up-to-date experience, favorable and unfavorable, is welcome at this time. Dr. Grossmann, whose paper before the May meeting of the American Iron and Steel Institute is here abstracted, analyzes 11 of the claims made for the process, giving support to most of them.

The author presents three applications which have been found unsuitable, such as nitriding sand spray nozzles, nitriding surfaces that come in contact with mineral acids, and nitriding parts subjected to heavy or repeated impact.

Among new developments which appear promising is successful welding with atomic hydrogen followed by nitriding.

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aluminum-nitrogen compounds being the particles which impart to the iron its hardness (resistance to deformation).*

Now a higher temperature may be expected to cause more rapid diffusion, and there are certain data which support our hypothesis. It is known from the data of many observers that higher nitriding temperatures lead to lower hardnesses.

Among several possible explanations is the assumption that there is more agglomeration of the aluminum nitride, leading to lesser effectiveness in hardening. That this explanation is highly probable appears from some data presented by Sergeson, who showed that a nitriding steel once hardened at a high temperature (1200 deg. F., 650 deg. C.) with resulting lower hardness, will not become hard when renitrided at proper temperature (950 deg. F., 510 deg. C.); whereas adjacent to the previously nitrided section, a fresh section in the same piece of steel will harden to full hardness.

It appears then that, when sufficient nitrogen has once been absorbed, the aluminum atoms become as it were saturated, or entirely bound by nitrogen atoms, so that they no longer have any capacity for binding further nitrogen atoms, or forming in association with them any hardness-giving particles. Further, it appears that, once these aluminum-nitrogen groups have been formed within the steel, their power to diffuse becomes relatively extremely slight, as evidenced by the fact that steels hardened at 950 deg. F. (510 deg. C.) can then be reheated to temperatures as high as 1400 deg. F. or perhaps even 1800 deg. F. without losing hardness (provided of course that they are protected from scaling or other surface effects). It should be emphasized that it is the temperature of first nitriding that is important, and we assume this temperature to be the vital factor in determining the particle size of the aluminum-nitrogen groups.

We summarize our hypothesis then, finally, by saying that it seems reasonable to attribute the hardness of Nitralloy to the presence of very finely agglomerated aluminum-nitrogen compounds dispersed in the alpha iron.

*Aluminum is mentioned here as typical of the nitrogen hardening elements, of which it is seemingly the most powerful. Other such elements include chromium, molybdenum, vanadium and others.

Problem of Metal Containers

There are a number of points on which evidence has accumulated in the past two years, some of these points being of advantage in the development of Nitralloy, and some of them indicating applications where Nitralloy is not suitable. Briefly, they are as follows:

It was found that, with many of the metal containers used as nitriding pots, the depth of case (obtained on the pieces being hardened) decreased with continued use of the nitriding container over long periods of time. If the container was replaced, the nitriding became again as good as ever.

The conclusion was inescapable that a change occurs on the inside surface of the container which decreases the efficiency of the ammonia in nitriding. This was a serious obstacle, and the data at hand indicate that only two successful containers have been developed up to the present time. One of these, an early foreign development, consisted in using as container a nickel-chromium alloy containing about 25 per cent chromium and 20 per cent nickel. A more recent development uses a container enameled on the inside. These enameled containers seem highly promising, one of them having been in service already for over 2700 nitriding hours.

For protecting certain parts against nitriding a tin coating still appears to be the best. The pieces may be tinned hot using sometimes an alloy half tin and half lead, or the regions may be given a coating of tin electrolytically. The waterglass mixtures give some protection.

Unsuitable Applications

Applications which have proved unsuitable are as follows:

1.—In articles like sand spray nozzles nitrided steel has failed to give satisfaction on account of the comparatively shallow depth of case. Even with the very high hardness, the surface case is soon abraded away and then the unhardened Nitralloy below offers very little resistance.

2.—In the presence of mineral acids nitrided surfaces offer very little resistance and such applications hold very little promise. Furthermore, in neutral solutions there should be no foreign metals, such as brass in contact, else the corrosion is very rapid. In alkaline solutions, however, nitrided surfaces are satisfactorily resistant.

3.—Where there is heavy or repeated impact, such as in clash gears or impact gears, the commonly used nitriding steels do not have sufficient core strength. The case is soon cracked and the article is no longer useful.

There are some new developments which appear extremely promising. Among the most recent of these to be established commercially is atomic hydro-

gen welding. Pieces welded in this manner have been subsequently nitrided to over 800 Brinell on the weld metal.

Other promising developments are possible with the use of other alloying elements and it can be said on the whole that, with the present widespread research and development work and with the work of the furnace companies in reducing the cost of nitriding, the future, in spite of some acknowledged drawbacks, seems to indicate extended use of the process.

*Discussion by H. M. German**

Since Dr. Grossmann's appraisal does not cover all of the essential developments, it is thought that the best discussion of this paper would be to supply some of the missing items.

Nitriding steels have passed the experimental stage and are well into production. Records of the Nitralloy Corpn. show a constant increase in the use of these steels since their introduction. In spite of the recent decline in the production of most of the specialty steels, nitriding steels have held up remarkably well. Tonnage reports for the first quarter of 1931 show a substantial increase over the first quarters of 1929 and 1930. New applications are being developed every day.

Introduction Failures

When nitriding steel was first introduced, steelmakers were working under a severe handicap. Probably due to the zeal of those who introduced it in this country, certain claims were made which could not be substantiated. The nitrided surface was said to have a Brinell hardness of 1100 to 1200. While it is possible to obtain this hardness with a given nitriding procedure, it cannot be secured with the accepted practice. Users obtaining a surface hardness of Brinell 900 to 1000 felt that there was something wrong with the steel or their process, as they were not obtaining the maximum results. Later service tests have proved that nitrided surfaces having a Brinell hardness equivalent of 850 to 1000 are sufficiently hard for practically all applications.

At the present time there is no standard method of making and reporting hardness values of nitrided surfaces. The two commonly used testing machines are the Vickers and the Monotron. In reporting hardness determinations the type of machine used should be stated, as values obtained with the Monotron are consistently higher than those obtained with the Vickers.

Non-Corrosive Properties

Considerable emphasis was also placed on the non-corrosive properties of the nitrided surfaces. This was misleading, as users expected to obtain non-corrosive properties equal to those exhibited by the chromium and chromium-nickel alloys. While nitrided surfaces are more rust-resisting than commercial steels, they do not approach the effectiveness of the chromium alloys.

Most of the early failures were due to lack of knowledge of the necessity of heat treatment to place the steel in the most receptive condition for nitriding. Other unsuccessful results are traced to failure to remove all decarburized areas before nitriding.

Effect of Alloys in Nitriding

The question has frequently been asked, What steels can be nitrided? The answer is that practically all steels can be nitrided, but only those containing some combination of aluminum, chromium, molybdenum and vanadium will produce a surface possessing the desired combination of depth of penetration, hardness and toughness. The elements aluminum and chromium produce high surface hardness and stability, while molybdenum and vanadium promote depth of penetration and toughness.

Types of Nitriding Steels

There are several distinct types of nitriding steels.

1.—The Nitralloy type: This contains 0.80 to 1.30 chromium, 0.75 to 1.25 aluminum and 0.15 to 0.25 per cent molybdenum. There are three grades which vary only in carbon content—G contains 0.30 to 0.40 carbon, H contains 0.20 to 0.30 carbon, and I contains 0.12 to 0.20 per cent carbon.

2.—The aluminum and molybdenum, or "Alamo" type, which contains 0.25 to 0.35 carbon, 1 to 1.50 aluminum and 0.60 to 1 per cent molybdenum.

3.—The chromium-vanadium type, having the following approximate composition: Carbon 0.25 to 0.35, chromium about 1.50, and vanadium 0.45 per cent minimum.

4.—Another type, featuring a high percentage of chromium and designed to produce a hard core which will better support the nitrided surface. The essential characteristic of this type is that the steel will possess good secondary hardness properties, so that it will not be softened at temperatures slightly above the nitriding temperature.

No one type of nitriding steel will fulfill all requirements. The selection of the proper type for any application can only be made after a study of the service to which the parts will be subjected and then applying that type whose physical properties and characteristics are best adapted to the individual job.

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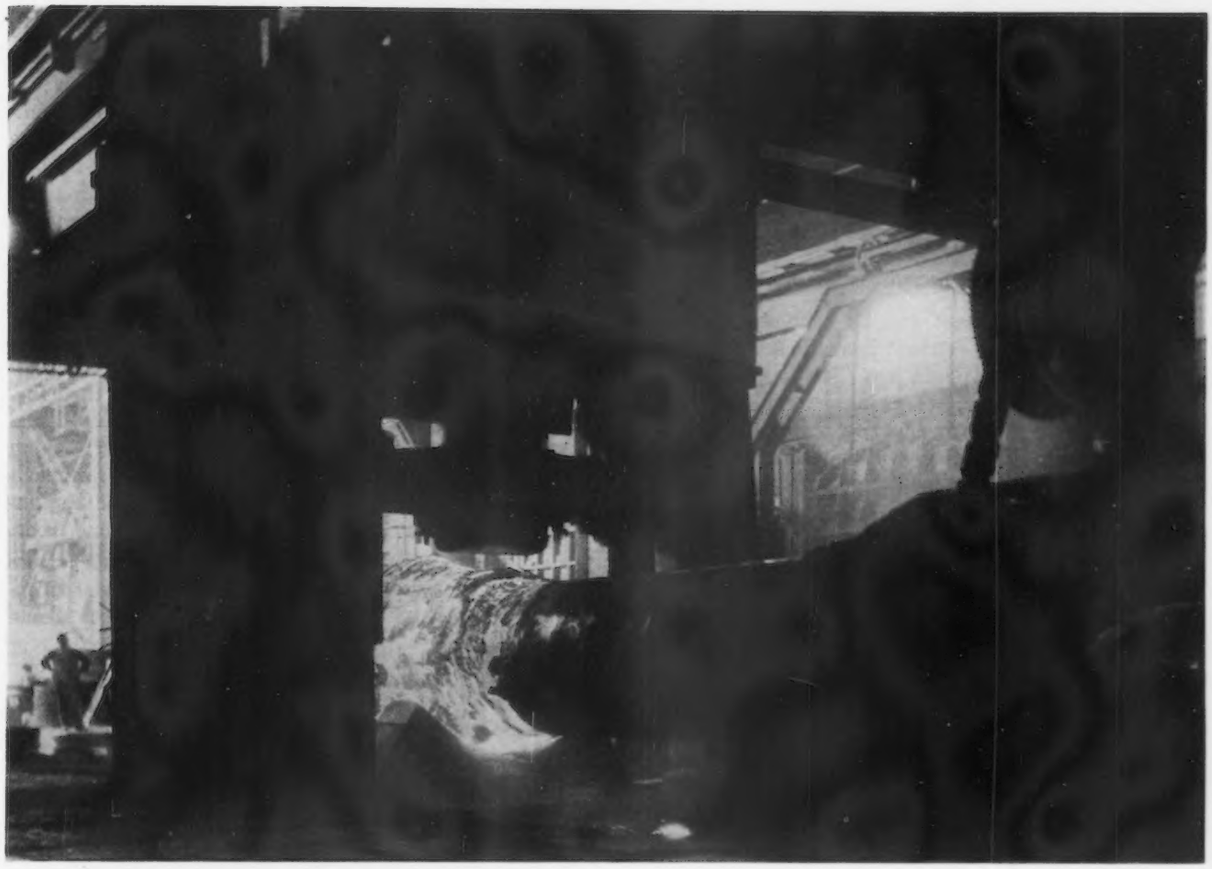
Carbon Reduces Oxides of Iron in Definite Steps

REDUCTION of the oxides of iron by carbon takes place in definite steps in the absence of oxygen, according to experiments by H. H. Meyer, reported in the *Mitteilungen* of the Kaiser-Wilhelm Research Institute, Berlin, Germany. Temperatures at which the different reactions take place are widely separated, thus differing from those in the reduction by carbon monoxide or by hydrogen, says an abstract in the London *Iron and Coal Trades Review*.

Thus the difference in temperature between the reduction of ferric oxide and that of the magnetic oxide is 300 to 370 deg. C., according to the kind of carbon used, while that between the reduction of magnetic oxide and ferrous oxide is about 100 deg. C. The actual temperatures at which the reductions commence vary by about 150 deg. C. for the various sorts of carbon. The reduction of ferric oxide to the magnetic oxide is so complete that it can be used to determine the quantity of ferric oxide contained in mixtures of the oxides, even in presence of metallic iron.

*Sales metallurgist, Crucible Steel Co. of America, New York.



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POWER equivalent to that of several regiments of village blacksmiths is embodied in this 9000-ton hydraulic forging press—an achievement and at the same time a symbol of this reign of the machine.

Through such concentration of power is made possible the production of equipment which in turn will compass still greater power,—in this case a 60-inch diameter pressure vessel, 50 feet long and weighing 65 tons.

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What About Apprentices These Days?

(*Concluded from page* 1805)

ticeship, must carry on a continuous program, not a fair weather program.

Must Have Support of Foremen

This same argument can be applied to the shop organization, the department heads and foremen who actually train the apprentices. It has been amply demonstrated by experience in many plants and in many localities that the effort of the organization in the training of apprentices will depend upon the determination of the management that apprentice training is necessary and must be carried on, except in the case of one or the other individual who may have developed a personal interest in young men and their training for industry.

Foremen and department heads will not take the interest of management in apprenticeship very seriously if they are directed to lay off apprentices every time business becomes a little slack. They will argue justly enough that the apprenticeship policy is mere pretense and not based on conviction.

How to Keep Apprentices Busy

It is one thing to realize that it is a pernicious practice to lay off apprentices in times of depression; to keep them busy when less and less work is coming into the shop is quite another. Under those conditions, difficult questions regarding the apprentices will arise and must be answered. For instance:

1. *What is to be done when operations have been restricted to such an extent that it is no longer possible to give apprentices the kind of work which the agreement specifies?*

Every apprentice indenture should provide a flexible work schedule to take care of such emergencies. The apprentice schedules of work are laid out in detail not so much because this detail is absolutely necessary in itself but rather to prevent carelessness in the division of the time. After all, when a foundry apprentice has completed his course, it makes little difference whether he worked 2400 hr. on green sand molding and 1300 hr. on dry sand or vice versa, or whether he spent 1500 or 1900 hr. in the core room.

A flexible work schedule will provide a long period of "special work" or "unassigned time" which may be devoted to any kind of work in the shop, all of which has at least some training value. And in times of depression apprentices will be glad to do what work there is.

If an apprentice indenture fails to include a provision of this kind, a change can easily be made with the consent of all parties concerned.

Putting Apprentices on Part-Time

2. *When worst comes to worst, should a few apprentices be laid off, perhaps the younger or less capable, and the remainder continued at full time, or should the hours of all be reduced?*

The present depression seems to have established the principle almost universally that hours rather than working forces should be reduced and this applies to apprentices as well as to general employment. In this way, contact and interest are maintained, the confidence of the community is continued and the apprentices are not tempted to make less advantageous connections elsewhere.

3. *When the reduction of working hours becomes necessary, shall apprentices be given an advantage over other employees or shall all be placed on the same schedule?*

Some employers give apprentices certain advantages. They feel that they are entitled to them because in prosperous times the apprentices are bound by their agreement and cannot roam about looking for the best jobs and the highest pay. Other employers give married men the preference and place apprentices and regular single employees on the same basis.

In a meeting of Wisconsin apprentice supervisors and directors recently held by the Industrial Commission of the State, it was found that the second plan was followed in the majority of the plants represented.

Should Lost Time Be Made Up?

4. *Should apprentices be required to make up the time lost through reduction of working hours or should they receive credit for the time lost?*

The answer depends upon the wording of the agreement. If the agreement requires the apprentice to complete a certain number of years, weeks or days of work, the reduction of hours can hardly be held against him and he must receive credit for the time off. If the agreement specifies that he shall work a certain number of hours, then he does not receive credit for the time he loses.

It is usually considered that the training of an apprentice requires a certain amount of time and that, if this time is not completed, the training will not be effective. For this reason the modern tendency is to arrange a work schedule in terms of hours so that thorough training will be given the apprentice in any case.

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Facts and Figures on the Automobile Industry

INFORMATION on the automobile industry is covered in great profusion in the 1931 edition of "Facts and Figures," published by the National Automobile Chamber of Commerce. There are 96 pages, including index. Most of the space is taken up with tabular matter, reinforced with diagrams, showing the growth of the industry and particularly the 1930 output figures, etc., compared with those of preceding years.

The wholesale value of motor vehicles, including parts and tires, is given as $3,330,775,532 for 1930, of which passenger cars represented slightly more than one-half and replacement parts, accessories and tires aggregated $939,000,000. Trucks accounted for $406,000,000, while the remainder covered parts sold by manufacturers. The wholesale value of sales was almost double the figure for capital invested, which is given as $1,880,808,233.

CHROMIUM PLATING FOR RESISTANCE TO ABRASIVE WEAR

By ROBERT D. ZIMMERMAN
Metallurgical Department, Ingersoll-Rand Co., Phillipsburg, N. J.

A LARGE manufacturing company applies chromium to the surface of metal objects to improve their resistance to abrasive wear.

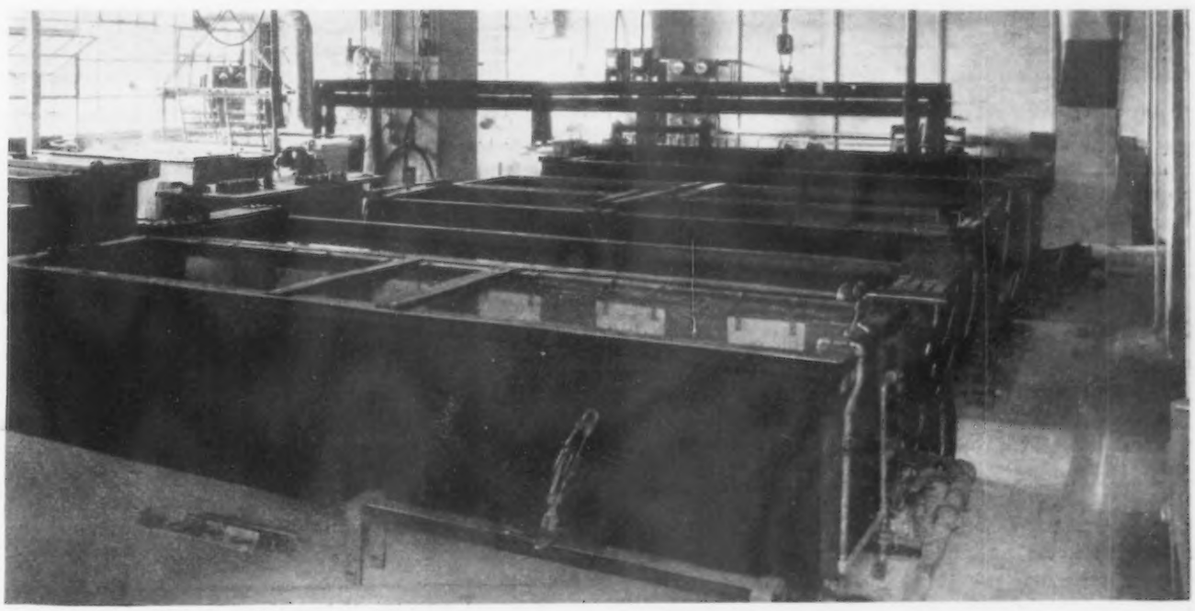
Objects plated include not only various parts which enter into the manufactured products but also many shop machine parts, tools and fixtures. The chromium plate is applied directly to the metal from which the article is made and no undercoat of copper or nickel is used.

This article describes the equipment and how the work is prepared. Another, to be published later, will discuss anodes, setting up, production fixtures and the finished plate.

A STUDY of the possibilities of chromium plating was started by the Ingersoll-Rand Co. several years ago. In May, 1929, after entering into a license agreement with the United Chromium Corpn., a plating installation was put into operation at the Phillipsburg, N. J., plant. As trial applications became regular ones, the capacity of the original installation was no longer adequate and a larger unit was added. This second unit went into operation in August, 1930, and the two now comprise a regular production department. It is controlled by the metallurgical department and its service is available to all plants of Ingersoll-Rand Co.

Mainly for Wear Resistance

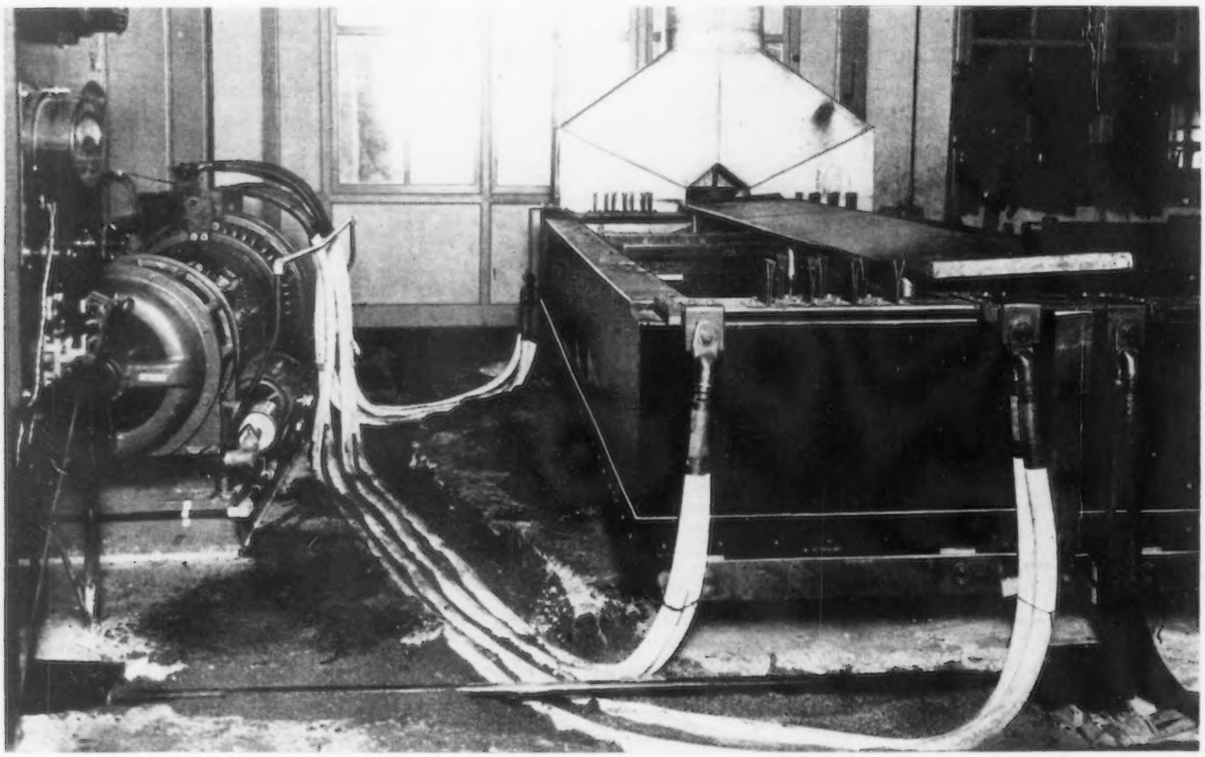
The activities of this department are directed exclusively toward application of chromium to the surface of metal objects for the purpose of improving their resistance to abrasive wear. This class of work is known to the trade as "hard" plating, which does not mean that the chromium is any



The plating department as it now appears

harder than when used for decorative or bright plating, but simply that it is applied to provide a hard surface. The objects plated include not only various parts which enter into the product manufactured but also many shop machine parts, tools and fixtures.

The customary residual thickness of plate is 0.002 in., residual in this sense meaning the thickness which is actually on the part when it goes into service. Sizing by grinding is usually necessary and in such cases an additional thickness of 0.002 in. is applied. In a few cases the residual plate is as much as 0.035 in. Compared with the few minutes required in bright plating, such thicknesses require long periods of time, an hour (minimum) being required to deposit 0.001 in. on external surfaces while as much as twice this time may be required for the surface of holes.



Piping and electrical details as they appear before closing the floor around the 500-gal. unit, shown in this illustration and the two on the opposite page.

No Under-Plating of Copper and Nickel

The plate is applied directly to the metal from which the article is made. Under-plates of copper and nickel used in bright work are omitted because they are considered both unnecessary and undesirable. They are not required for bonding or for finish, and are undesirable because they are soft. Chromium is inherently brittle, although not, perhaps, in moderate thicknesses, to the degree commonly supposed. However, it is considered best to provide comparatively hard backing when localized pressures of high intensity are likely to be encountered. For this reason, if it has been customary to harden a certain part previous to the adoption of chromium plating, this hardening is applied even though the part is to be plated.

That the plate be smooth and uniform is, of course, essential, but the lustre usually associated with chromium plate is unnecessary. A good commercial grinding job on the article to be plated insures a satisfactory finished surface for most mechanical purposes. A satisfactory bond sometimes requires mild sandblasting of the ground surface. Fairly bright plates which feel smooth as they come from the bath will cause much less rapid wear of parts against which they are operated if the plate is lapped before being put into service.

While considerable variation in thickness of thin decorative plate might not be noticeable, it is a characteristic of electro-plates that this variation occurs at an increasing rate as the time of plating increases. Any marked tendency toward lack of uniformity in rate of deposition of heavy plate would mean the addition of considerable plating time to insure sufficient chromium on points of slowest rate of deposition.

To insure a uniform rate of deposition the customary flat anodes have been dispensed with and conforming anodes are used exclusively. The use of conforming anodes necessitates such equipment and methods as to create something which differs considerably from the usual conception of electroplating.

Instead of visualizing the plating of an object as suspending it in an electrolytic solution tank by

means of wires or hooks, we more properly think of the operation as "setting up" the object as part of an electro-mechanical assembly and then making this part of a larger assembly which includes the tank. Equipment and methods at Phillipsburg are such as to facilitate such operations.

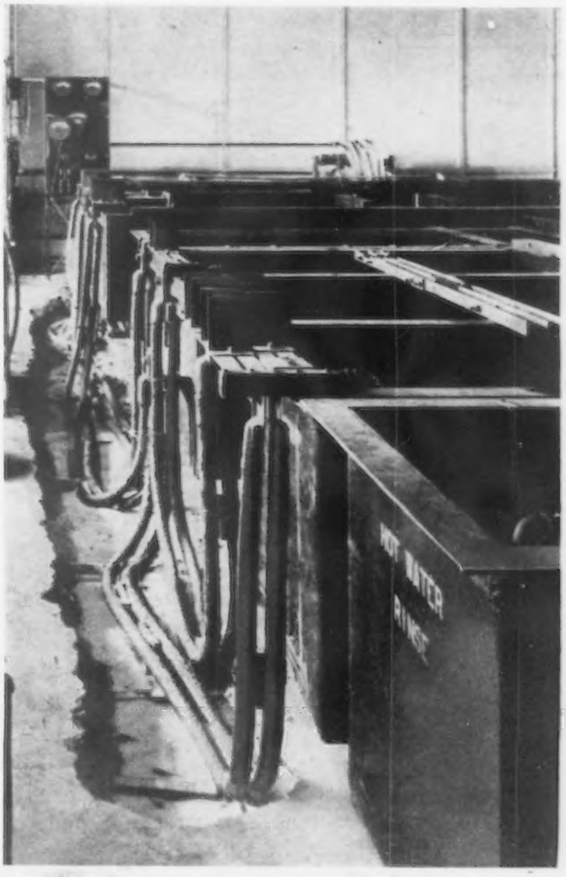
Equipment That Is Used

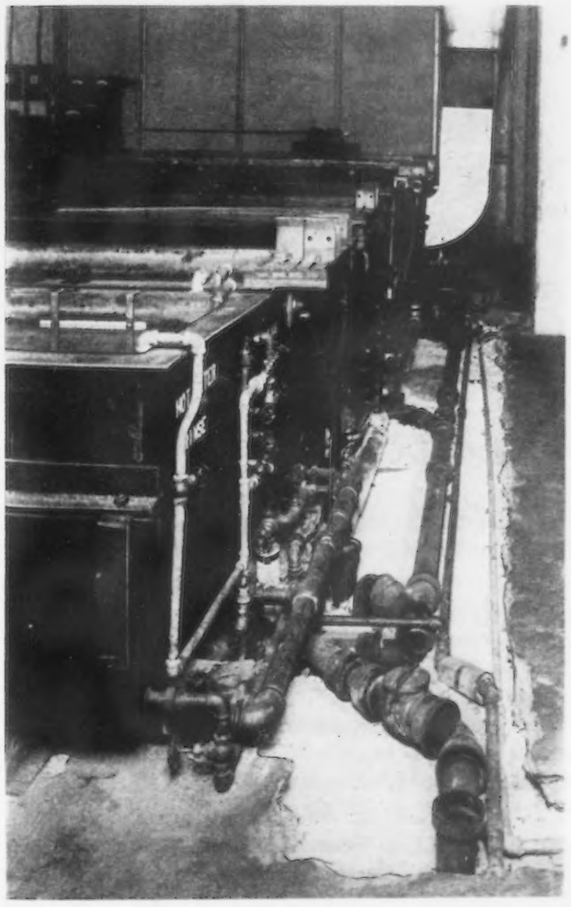
The plating plant, a general view of which is shown in one of the illustrations, consists of two independent units, the first one installed being of 100-gal., 1000-amp., and the second, 500-gal., 2500-amp. capacity. They are both United Chromium outfits and each includes six tanks in the following order:

Tank	Unit No. 1 (100 Gal.)	Unit No. 2 (500 Gal.)
1	Hot water rinse	Hot water rinse
2	Electric acid cleaner	Alkali strip
3	Alkali cleaner	Alkali cleaner
4	Cold water rinse	Cold water rinse
5	Plater	Plater
6	Plater	Electric acid cleaner

All tanks are of steel or Armco iron, the plating and electric acid cleaner tanks being lead-lined and provided with automatically controlled steam coils, giving a uniform temperature of 45 deg. C. and permitting 24-hr. or "over week end" operation without the continuous presence of an attendant.

The intermediate rinse tank used in many bright plating plants to recover solution drag out has been purposely omitted since, due to the longer time





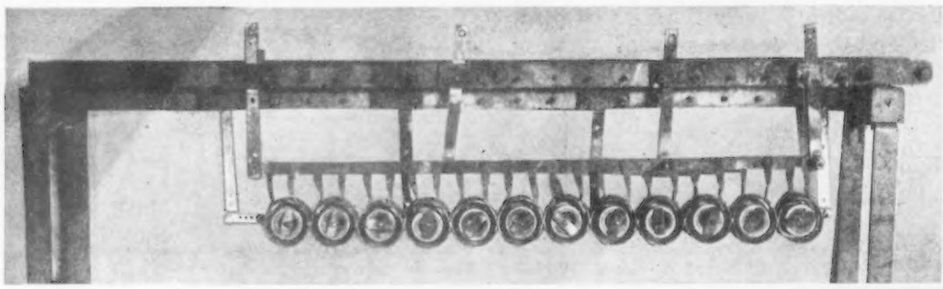
cycle, the loss does not justify the risk of contamination which may be present in reused solutions.

An exhaust system is provided for the electric acid cleaning and plating tanks and electrical connections are provided on all except the rinses, the bus bars serving one end of the small tanks and both ends of the large ones. Spring clips are mounted on these bars to receive the "composite bus bar," which is a three parallel bar assembly to which work fixtures and anodes are bolted, work to center bar, and anodes, in halves if necessary, to two outside ones. A close-up of this bar is shown in one illustration.

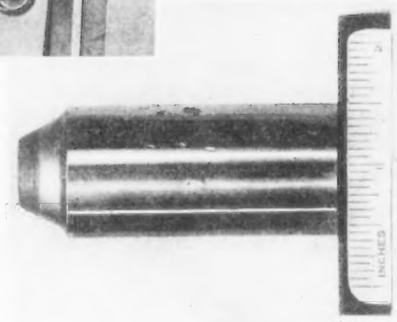
The clips are arranged so that by merely lowering the composite bar into them the proper polarity is obtained, i.e., work negative in plater and alkali cleaner and positive in the electric acid cleaner and strip. I.R. Type B-1000 air hoists over each line of tanks are used in handling work and a special wheeled truck is used in making transfers from one line to the other.

A special yoke bar, shown hanging from the hoist hooks, permits mounting two composite bars in tandem for long work and shorter yoke bars are provided to supplement the strength of the composite bars when very heavy work is to be handled. Other photographs, taken just before closing the floor around the 500-gal. unit, show piping and electrical details.

The shops are instructed to send to the plating room only work which has been thoroughly cleaned.



A case of blistering in plating when work is not properly cleaned. (Below)



Composite bus bar to which fixtures and anodes are bolted. (Above)

When received by the plating room, any traces of rust are removed with abrasive cloth and, if any trace of grease remains, the parts are thoroughly washed in gasoline. Parts of either cast iron or of case-hardened steel are sandblasted. It is only after these preliminary operations have been completed that the parts are allowed to pass through the various cleaning operations which are a part of the plating procedure itself. In this manner the electric cleaners are contaminated very slowly. Blistering such as may be expected when work is not properly cleaned is revealed in one of the illustrations.

Path of Work for a Typical Steel Job

Following is the path of a typical steel job. After being mounted on the composite bus bar the work is (1) immersed in the electric alkali cleaner (at a temperature just under boiling) for approximately 15 min. The tank acts as anode and the voltage is either six or the voltage in use if other work is in the plater at that time. If this voltage is low the time is, of course, lengthened. (2) It is then rinsed in cold running water and pumice stone used if necessary to remove "water breaks." (3) The anodes are then assembled to the composite bar and in proper relation to the work, care being exercised to prevent their rubbing over the cleaned surface to be plated. The assembly is immersed in the electric acid cleaner (at about the same temperature as plater) for about 3 min. Here the work is made anodic (positive) and the voltage is usually the same as for plating. (4) From the electric acid cleaner the work goes directly to the plater without water rinsing. In adding to a previous plate about 20 min. is used in building up to the plating voltage, otherwise the full plating voltage is applied immediately. (5) After plating, the work is given a cold water rinse and then dried either by a hot water rinse for large work or by sawdust for small work.

Finished work, which is only plated locally—for instance, a steel shaft having a wheel fit built up—instead of being dried, is given a dip in the hot alkali tank and not rinsed so as to prevent rust on unplated portions. This dip, minus rinse, is also used for work already cleaned, but which must wait several hours to be put into the plater and is a very convenient way of furnishing temporary protection to work-holding devices, etc. Work so treated is rinsed in water before being placed in the electric acid cleaner.

(To be concluded)

Ball and Roller Bearings in Construction Equipment

FOUR leading manufacturers of ball and roller bearings report that they have furnished frictionless bearings for nearly all lines of construction equipment, according to *Engineering News-Record*. As an example of the rapid expansion along this line, one company reports an increase of 20 per cent in sales to the construction industry during the past nine months.

Another manufacturer states, "It has been our experience that the use of anti-friction bearings in construction equipment has grown tremendously in the past few years, particularly heavy-duty roller bearings, which are able to withstand the hard service to which these units are subjected and which eliminate the necessity for frequent oiling—something which is almost continually neglected by the user in this field."

Machines equipped by the four companies include power shovels, cranes, draglines, excavators, ditchers, pavers, concrete mixers, hoist sheaves and blocks, tractors, heavy-duty trailers, portable saws, pneumatic equipment, asphalt plants, hoists and derricks, road rollers, gasoline and electric power units, wheel and power scrapers, clamshells, trucks, road graders and maintainers, and locomotives.

The four companies reporting are the New Departure Mfg. Co., Norma-Hoffmann Bearings Corpn., Timken Roller Bearing Co. and SKF Industries, Inc.

RECENT PRACTICES IN THE MAKING OF PATTERNS

HOW to secure better cooperation between the pattern shop and the foundry, premium systems for pattern shops, and standard pattern color markings were among the subjects discussed at the round table meeting on pattern production held in connection with the recent annual convention of the American Foundrymen's Association at the Hotel Stevens, Chicago. It was the first time in the association's history that a session was devoted to problems of the pattern shop. The large attendance testified to the interest in this phase of foundry activity and indicated that the association might well consider the meeting as a forerunner of others on the same subject at future conventions.

Use of Paint on Patterns

In regard to standard pattern color markings, some foundry representatives declared that they found it difficult to convince jobbing shops to adopt these markings, because of the additional cost. However, through a process of education, several companies have been successful in their efforts. Color marking is intended specially for wood patterns from which a few castings are to be made and its purpose is to let the foundry know what kind of casting is desired. One company has persuaded foundries manufacturing its castings to keep patterns clean with two good coats of lacquer, this simple process resulting in patterns being returned in satisfactory condition after being out as long as two years.

It was suggested that the purchasing agent ordering patterns should put on the requisition, "must be built according to A. F. A. standards." Jobbing shops then would be able to estimate all essential costs in pricing work. One of the difficulties created by painting patterns is the tendency of the paint material to make the exterior of the pattern sticky, especially in periods of high humidity. To overcome this annoyance, the American Laundry Machinery Co., at its Syracuse, N. Y., plant, uses a special pattern lacquer. It likewise was revealed that a Cleveland company is soon to put on the market a waterproof enamel, to be applied to metal or wood patterns, which excludes moisture, is transparent and hardens like glass. It is designed to eliminate the stickiness of present-day finishes which causes foundrymen so much trouble in handling patterns.

Standard Core Prints Advocated

During a discussion of standard core prints a paper by W. C. Ewalt, Walworth Co., Kewanee, Ill., on "Horizontal Core Prints" was introduced. Mr.

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HIGHLIGHTS OF PATTERN PRODUCTION ROUND TABLE MEETING

PATTERN costs have been reduced by Wrought Iron Works, Chicago, by a premium system of paying pattern makers. On large jobs the system is applied on a group basis.

* * *

Pattern shop and foundry superintendents should cooperate, having in mind the best pattern at the lowest cost to the company.

* * *

One company has persuaded foundries making its castings to keep patterns clean with two good coats of lacquer, this simple process resulting in patterns being returned in satisfactory condition after being out as long as two years.

* * *

Pattern makers should be encouraged to visit the foundry and the molder visit the pattern shop in order that each will get some conception of the other's problems.

* * *

Several automobile manufacturers now write specifications for patterns, thus eliminating much trouble with the pattern shop, foundry and user of the casting.

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Ewalt said that conservation of time and material would be a major advantage from the setting up of rules governing the length of pattern prints. Since many foundrymen make estimates from a blueprint, they could tell by the additional length of the print needed how large a flask should be used. Perhaps more patterns could be put on a plate, and unnecessary ramming would be eliminated.

Objects to be considered, according to Mr. Ewalt, are: Crushing strips, clearance between core and mold, total bearing surface of core, cores with angle prints, safe load per square inch of mold, maximum head of metal, strength of cores (with and without rods), weight of core, weight of iron and buoyancy of core. Several companies, including International Harvester Co., are using a chart of standards on tapered core prints. One company has had 1000 charts printed, giving one to every new customer with the request that he adhere to these standards.

Reducing Pattern Costs by Premium System

Pattern costs have been reduced by the Wrought Iron Works, Chicago, by a premium system for workers which has cut overhead expenses 25 per cent. That is, if a certain job is estimated to take 100 hr. and the employee makes the pattern in 70 hr., the company saves $2 an hour or a total of $60 in overhead. The time required for a job is set to match the speed of an average worker before the job goes into the shop. The premium incentive, which goes to the worker in the form of a cash bonus, tends to speed up the slow man. Although it likewise encourages the entire force to "get by" with everything possible in order to attain the bonus, rigid inspection prevents production of poor work. If anything is wrong with the pattern on final inspection, the pattern maker must make corrections on his own instead of the company's time. If a worker fails to achieve the bonus on a job, he is paid the regular hourly rate. On a large job, the premium system is applied on a group basis.

The value of having a pattern produced in cooperation with the foundry which is to make the casting was stressed by several speakers. The pattern shop and foundry superintendents should discuss together how the pattern is to be constructed, having in mind production of the best pattern at the lowest cost to the company rather than the cheapest expense to either the foundry or the pattern shop.

Without cooperation between the designing department and the pattern shop, said Olof Skeppstedt, John Deere Harvester Works, East Moline, Ill., the cost of both patterns and castings is prohibitive. A knowledge of the fundamentals of the foundry will greatly assist the designer in simplifying the cast parts of his product. By slight changes of a few lugs or ribs he can make the foundry procedure smooth. It is obvious, therefore, that cooperation should begin before work has taken concrete form.

Mr. Skeppstedt emphasized that a shop should endeavor to design and construct a first-class pattern job in the shortest possible time by the use of modern methods. Pattern equipment, failing to give satisfaction or which can be eliminated, should be ordered back to the pattern department and be improved upon immediately. The pattern department cannot be given credit for good work until the cost of production in the foundry has been established and the finished casting has been put to use.

Pattern Maker Should Visit the Foundry

Arthur Colman, Barber-Colman Co., Rockford, Ill., suggested that one of the best ways to obtain cooperation between the pattern shop and the foundry is to have the pattern maker visit the foundry and the molder inspect the pattern shop, each getting a conception of the special problems confronting the other. He said that a good pattern misused soon becomes a poor pattern with poor castings as a result.

The pattern buyer should be educated to the fact that good patterns are the most economical and that cheap patterns are injurious to him and to the foundry alike, according to several speakers. Vaughan Reid, City Pattern Works, Detroit, who was chairman of the meeting, stated that automobile companies now are writing specifications for their patterns, thus eliminating much trouble which formerly arose between the pattern shop, foundry and the user of the castings. It has taken years of effort to accomplish this, but the benefits are evident today in increased cooperation between all parties concerned. Mr. Reid said that several automobile companies furnish pattern drawings in placing pattern business. Some have discontinued pattern shops, but have retained the layout room for making these drawings.

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Comparative Tests of Rails of Different Types

FOUR types of rails of similar sectional area formed the basis of a test made in 1928 by the Swiss Railroad Administration in an effort to determine the relative wearing qualities of the rails. These were put into a section of the St. Gothard line between Faido and Biasca. They were put into service on curves, in straight sections and in tunnels, all of them under heavy traffic.

Relative wear for the four types of rail is shown in the illustration. Fig. 1 represents the normal rail of 1926; Fig. 2, the normal rail of 1928; Fig. 3, the manganese rail of 1928, containing about 1.5 per cent manganese; and Fig. 4 a 1928 rail which had undergone heat treatment. The amount of wear is indicated by the blackened area at the upper right portion of the tread.

These rails are of 46 kg. to the linear meter (about 93 lb. to the yard). They show the progressive improvement from Fig. 1 to Fig. 4 in resistance to wear, depending upon the character of the material. Each rail was studied after having been in service for a period of six months.

These tests were reported in *Stahl und Eisen* of Nov. 6 last by O. Pilz and H. Meyer.

Two-Spindle Boring, Drilling and Milling Machine

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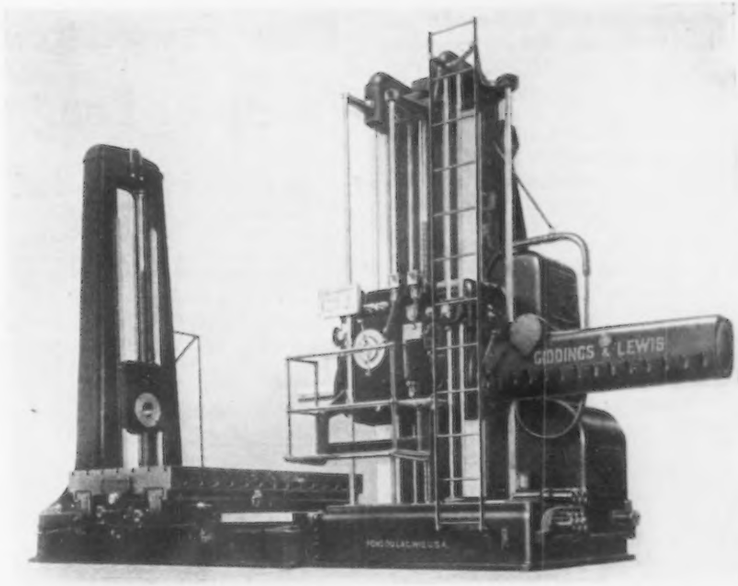

THE table-type boring, drilling and milling machine; the planer-type unit is illustrated below. All models have an auxiliary high-speed spindle. Electrical controls and indicating lights are grouped in the small panel on the head.

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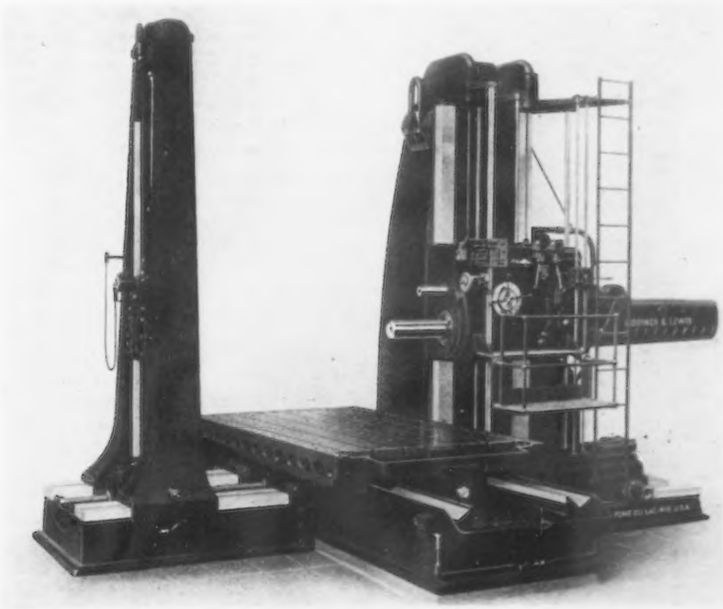
TWO spindles—a 7-in. main spindle and a 4-in. auxiliary high-speed spindle—comprise an important feature of the No. 70 high-power precision horizontal boring, drilling and milling machine recently added to the line of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Table, planer and floor types are built, each having a 144-in. vertical adjustment of the head on the column. The table-type machine, shown in one of the illustrations, can be made as long as required and with tables up 72 x 144 in. The end support block moves in unison with the head in the table and planer types. The head, column and base mechanism of the planer type move along a runway at right angles to the travel of the table. This construction is emphasized as providing all the production advantages of the table type.

Herringbone gears and preloaded combination radial and thrust ball bearings make for smooth and accurate spindle operation. A combined range of spindle speeds from 3 to 720 r.p.m. is provided by the two-spindle design. The main spindle has 36 speeds in geometrical progression. Having a speed range four times as great as the main spindle, the 4-in. auxiliary spindle also is provided with 36 speeds. A feed unit, built on to one of the front cover plates of the head, provides 18 feeds for either spindle. Any desired positive lead may be obtained through a set of pick-off gears, incorporated in the feed gear train. There is a handwheel for slow hand feeding of either spindle.



Only two levers are required for operating the speed-change gears and two for the feed gears. Position indicators and dials with the levers facilitate the selection of the desired speed. Feed to the spindles is by rack and pinion. A loose tooth at each end of the rack acts as a safety limit-stop and makes meshing of the rack and pinion certain upon reversing the feed. Feed is applied by pulling out on the quick-motion turnstile handles. An automatic depth gage and a spindle selector lever to prevent one spindle from coasting while the other is in operation are other features of the machine. Automatic lubrication is provided throughout the head.

The column for the head weighs about 18,000 lb. and is stiffened by inside ribbing in both directions to provide ample support for heavy milling cuts even at the extreme travel of the head. The head counterweight is within the column. Driving clutches for starting, stopping and reversing the machine are contained in the base. Independent of the boring and drilling feeds for the spindles, there is a complete milling feed mechanism in the base, providing 18 feeds and rapid traverse for moving all the units of the machine. By this mechanism it is possible to obtain a range of feeds especially suited for milling. Changing of these feeds is by means of a back gear and a rotary gear change lever mounted on the head of the machine close to the spindle feed change levers. Described as of importance in profile milling is the arrangement by which the direction of the feed to each unit is independently

controlled so that the feed can be applied to more than one unit simultaneously in either direction.

Electrical controls, concentrated in a small panel shown at the upper left hand corner of the head, are an important development. Through push buttons on this panel, the machine itself is started, stopped or reversed, the feed or rapid traverse is applied to any unit in either direction, and any or all of the units may be clamped in any position. Small colored lights, also on the panel, indicate which units are clamped and which parts of the machine are working. All the electrical contactors and other equipment for this control system are arranged compactly in a compartment outside of the column.

Specifications include: Range of feeds to main and auxiliary spindles, 0.005 to 0.250 in. and 0.002 to 0.125 in. per revolution, respectively; rapid traverse of all units, 120 in. per min.; and horsepower required, 40. The table type machine weighs approximately 115,000 lb. and the planer type, about 180,000 lb.

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John L. Spitzer, Schiavone-Bonomo Corpn., New York, was reelected president of the New York Chapter of the Institute of Scrap Iron and Steel, Inc., at the annual meeting of the chapter Thursday, May 28. P. W. Bowers, Perry, Buxton, Doane Co., New York, was elected chairman of the executive committee.

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V. E. Montgomery Co., Cincinnati, has been appointed representative of Gulf States Steel Co. for the district including Ohio, Kentucky and Indiana. V. E. Montgomery is president of the company and Walter Hopkins vice-president and treasurer.

New Fay Automatic Lathe for Wide Variety of Long and Short-Run Work

A NEW 12-in. Fay automatic lathe, intended for economical operation on continuous production or for small lot manufacture where several sizes and types of parts are required to make up a machine load, is being announced by the Jones & Lamson Machine Co., Springfield, Vt. The machine is built in four lengths of bed: 15, 21, 33 and 45 in. between centers. Swing over the center bar is 13¼ in.; over the carriage, 19½ in.

Short set-up time is a feature. Universal camming, standard tool blocks, wide range of speeds and feeds, and arrangements for multiple tooling make the machine suitable for a variety of work supported between centers or held in a chuck or fixture. All tool movements are controlled by cams on the outside of the drum, designed to permit machining of any piece with the shortest possible tool travel.

The bed is of box-ribbed construction, providing the necessary strength and stiffness for heavy work. Large storage space for chips is formed by a pan cast integral with the bed and easily accessible for cleaning.

Ball bearings are used on all shafts in the headstock. The drive is of the single-pulley type with a multiple-disk clutch in the main drive pulley. The spindle, an alloy steel forging accurately machined and ground, is mounted on ball bearings set up under a predetermined pressure. All gears and shafts are hardened, the latter being ground and mounted in ball bearings. Both fast motion and feed gear mechanisms are lubricated by a splash system from the headstock which runs in a bath of oil. The four sets of change gears provide eight standard spindle speeds ranging from 56 to 377 r.p.m. with the main drive pulley running at 1000 r.p.m. By means of a standard automatic speed shift shaft that can be installed, two speed changes may be made automatically while the machine is under cut. Spindle speeds up to 1500 r.p.m. can be obtained through semi-standard gearing.

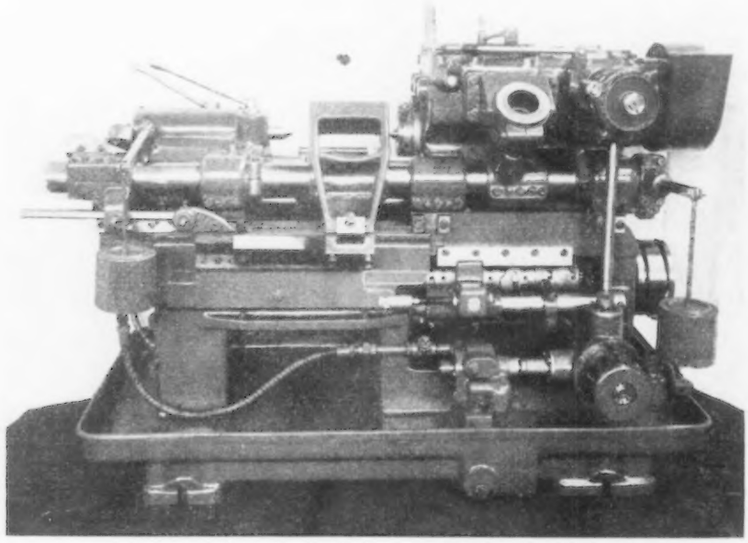
The front carriage or turning member is supported at the center of the lathe by a heavy steel center bar, accurately ground and supported in four renewable bearings in the headstock and tailstock. Mounted on a slide, gibbed to the front of the bed, is a hardened and ground former that carries the outer end of the carriage. Both center bar and former slide are moved longitudinally by cams on the drum. By setting the forming device parallel to the centers or at the angle desired, straight or taper, boring or turning, work may be produced. It is also possible to bore or turn uneven profiles or radii by installing a former of special contour. The turning tools may be arranged to relieve on the return stroke to prevent scoring the finished work.

Back Arm and Bevel Attachment

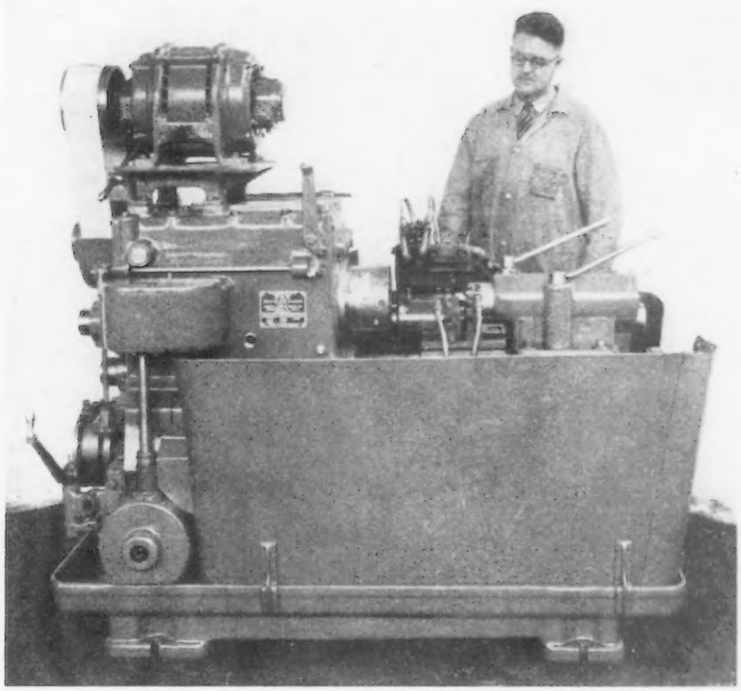
The back arm or facing member is mounted on a large ground steel bar held in three adjustable bearings in the headstock and tailstock. Its lower end contacts a side cam or former in a slide. This rear former slide may, by suitable camming, be drawn under the back arm. The back arm also may be moved longitudinally to turn straight, taper or curved surfaces. If required, a combination of turning and facing cuts may be taken by combining the longitudinal and facing movements. An adjustable bevel attachment may be obtained for facing bevel gears or similar parts.

All operations are controlled by the cam drum and its adjustable outside cams. There are two drum speeds: fast motion through a multiple-disk clutch at the rear for idle movements, and slow motion or feed through change gears and a feed shaft at the front of the machine. These drum speeds are changed automatically by means of adjustable cams. At the end of each complete machine-cycle an adjustable knock-off disengages the main drive clutch and stops the machine.

The main drum is located in a box-like recess directly beneath the headstock. Machines of the three larger sizes have two cam drums, one under the headstock and the other under the tailstock. An auxiliary drum can



Rear view of the Fay automatic lathe with bevel attachment on the back arm bar.



The 12 x 15-in. Fay automatic lathe; front view with chip guards in position. The large chip pan is integral with the base and easily accessible.

be attached to either end of the machine if more cam room is needed.

Nine carriage or turning feeds from 0.008 to 0.062 in., and nine back arm or facing feeds from 0.008 to 0.056 in. per spindle revolution are provided through five sets of change gears.

An auxiliary facing attachment or third cutting head may be attached to the machine. Supported on a bar mounted through the tailstock and held in an outboard bearing in the headstock, this device can be used for either facing or turning. A wide variety of tooling arrangements can be employed, including a center drive attachment.

Dovetail tool blocks and slides made of heat-treated alloy steel are furnished. The blocks are reversible in that they may be placed on a dovetail tool slide with the tool slot toward the headstock or tailstock, as desired. One wrench fits all screws and all dovetail slides and tool blocks fit both carriage and back arm. A standard taper turner operates in conjunction with the standard tool blocks, straight and taper cuts being taken simultaneously. Any curve or tapered surface may be machined with this turner, which reproduces any form developed in the operating template.

The machine may be equipped for motor drive through a short belt, as illustrated, or arranged with a hinged type motor plate for V-belt or chain drive. Any constant speed motor from 5 to 20 hp. may be used.

Approximate floor space required varies from 36 x 72 in. for the 12 x 15-in. machine to 36 x 106 in. for the 12 x 45-in. lathe. The machines weigh from 4800 to 6532 lb., respectively.

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Vertical Speed Reducer Has Spiral Bevel Gears

THE vertical spiral bevel gear speed reducer here illustrated, a new product of the D. O. James Mfg. Co., 1114 West Monroe Street, Chicago, is designed for smooth, quiet operation. Made in sizes from ½ to

100 hp., units are obtainable for ratios from 8:1 to 1600:1. For the higher reduction ratios, an integral planetary gear unit is provided.

Efficiency is emphasized for the spiral bevel gears which are designed to increase the number of teeth in contact and to provide a large bearing area between teeth. The driving and driven shafts are made of 0.40 per cent carbon steel and are mounted in roller bearings.

The mechanism is inclosed in a compact housing that prevents oil leakage and excludes dirt. The unit may be mounted either above or below the vertical driven shaft.

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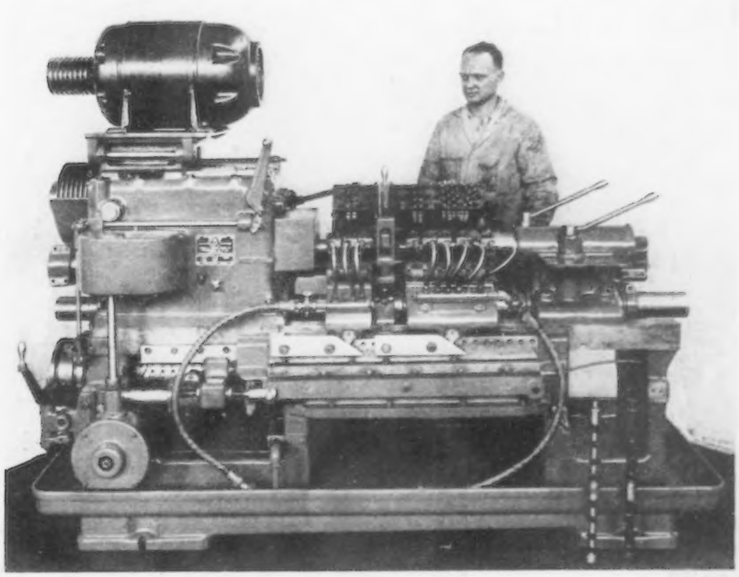
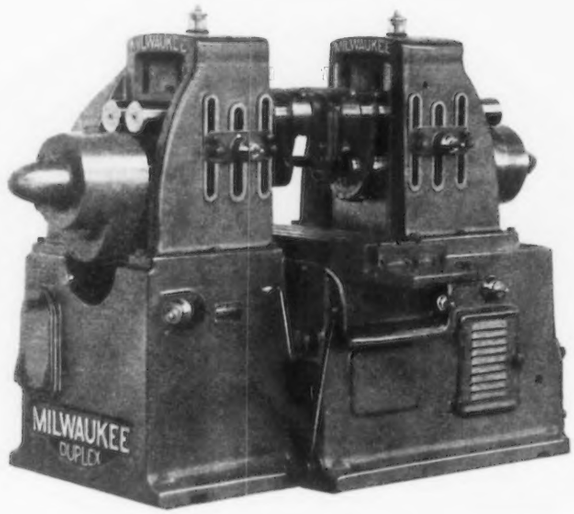
An efficient lubrication for open gears on cranes, excavating and other machinery can be made from ½ lb. white lead, ½ gal. cylinder oil and ½ lb. flake graphite, according to a news item released by the Link-Belt Co., Chicago. The white lead mixture may be made heavier for warm weather by using less oil or grease in proportion to the quantity of flake graphite.



This 12 x 33-in. machine is tooled to turn, face, neck and chamfer camshafts for a four-cylinder engine. Samples of the work are shown at the right.

Designs Duplex Miller with Speeds Up to 1000 R. P. M.



A PRODUCTION-TYPE duplex milling machine with spindle speeds up to 1000 r.p.m., and table feeds up to 100 in. per min., has been placed on the market by the Kearney & Trecker Corpn., Milwaukee. This "Milwaukee Duplex" is basically designed for the higher speeds and faster feeds possible with tungsten and tantalum-carbide milling cutters, its strength and rigidity also permitting maximum operating efficiency from high-speed and other steel cutters.

Three speed ranges are available—from 15 to 150 r.p.m., 30 to 300 r.p.m., or 100 to 1000 r.p.m., each of which has 12 speed changes. Speed changes of each spindle are made independently so that cutters of different sizes can be used as desired. In addition, it is possible to provide one spindle with any one of the three speed ranges, and the opposite spindle with either of the other two. This permits finishing of a small face on one side and a much larger face on the opposite side.

Three ranges of feeds—½ to 20 in., 1 to 40 in., or 2½ to 100 in. per min.—are also available. Each range has 18 individual feeds. Power rapid traverse of the table is at the rate of 240 in. per min.

The machine is made in two series, the 1200 and the 1800. The table for the 1200 series is 12 in. wide, and is furnished with longitudinal power feeds of 18, 24 or 30 in., while the table for the 1800 series is 18 in. wide and can be equipped with power feed of either 24 or 30 in.

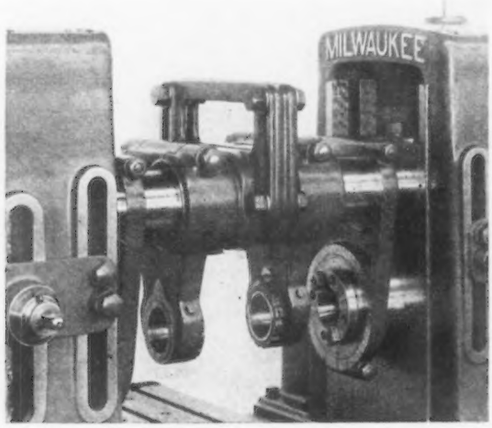
Each spindle is mounted in a 7-in. diameter hardened and ground quill and is provided with independent cross adjustment of 7 in. Movement of each quill is by a hand crank attached at the front of the uprights. A heavy brace ties each quill directly to the overarms, the quill thus being rigidly supported throughout its entire cross adjustment.

The spindles are driven through hardened herringbone gears, the large gear being attached solidly to the spindle and the driving pinion being splined to its shaft. This feature is emphasized as assuring positive and smooth drive throughout the entire cross adjustment of the spindle quills.

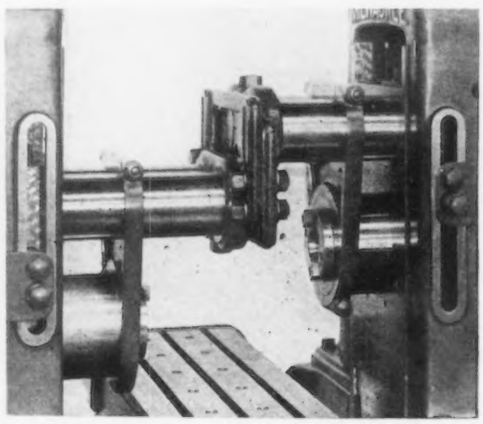
The double overarms of each spindle block can be laced together so that both spindles lie on the same plane, or with one spindle higher than the other, as shown in the accompanying close-up illustrations. The spindle blocks are mounted between two uprights and are alined by bearing surfaces for their full length. They are guided by a deep tongue slide and held to adjustment with a full-length gib. Vertical adjustment of these blocks is by a hand crank at side of machine having the control levers.

A feature of the table design is the mounting of the dogs in an inclosed, but accessible, compartment, to prevent chips interfering with their operation. The machine is lubricated automatically throughout and the large geared-type pump for coolant operates only when the spindle is revolving. All rotating members of the machine, with the exception of the spindle noses, are entirely inclosed. The flywheel and the rear end of the arbor bolt (at the left-hand end of the machine) is covered by a hinged guard, which protects the draw-in bolt and can be lowered by releasing a thumb screw.

The machine is equipped with a multiple V-belt drive and is driven either by a 7½ or a 10-hp. motor inclosed in a compartment and cooled by air drawn inward by the fan-type spokes of the main drive pulley.



THESE close-up views show methods of lacing together the double overarms of the spindle blocks; both on the same plane (left), or one higher than the other (right). Spindle speeds may be changed independently of each other.



Spiral Welded Pipe a New Outlet for Continuous Mill Product

SPIRAL-WELDED steel and ingot iron pipe, recently developed by the American Rolling Mill Co., Middletown, Ohio, after eight years of experimental research, is being produced direct from 200-ft. coils of No. 12 gage to ¼-in. steel or ingot iron, diverted from the continuous mill to the pipe manufacturing department. These coils are fed continuously through spiral pipe-welding machines, and a cut-off mechanism, synchronized with the speed of the pipe, severs the lengths desired, 40 ft. being the accepted maximum for convenience in shipping.

In developing this pipe, the object was to produce a new type of electric-welded light-wall pipe in gages and diameters adapted to most requirements of the process industries. At the same time it was necessary to have a manufacturing method which would fit in efficiently with the continuous sheet rolling mill.

A light-wall pipe made with a weld parallel to the length would be limited in diameter by the maximum rolling width for strip plate coming from the continuous mill. But it was found that by development of a machine that would form and weld the 200-ft. lengths of strip plate into a continuous spiral, it was possible to make light-wall pipe in all necessary diameters and in a variety of gages.

Design and inherent qualities of a spirally welded pipe are important. To insure tensile strength equal to, or greater than, the pipe material, the weld is made slightly heavier. To test the strength of this weld, hydrostatic destruction tests have been made. When 1040 lb. pressure was applied to a No. 10 gage ingot iron section, it fractured laterally without weld breakage or leakage.

One of the advantages claimed for spiral-welded pipe is that it can be furnished in the exact specifications required, ranging from 6 to 24 in. O. D., and in gages selected on the basis of the service in which it will be used. Each diameter is made in a number of different gages. Six-inch to 8⅝-in. pipe is made with Nos. 10 and 12 gage; 10-in. and 10¾-in., with Nos. 7, 8, 10 and 12 gage; and 12-in. to 24-in., with Nos. 3, 7, 8, 10, and 12 gage. Working pressures with a safety factor of four range from 90 lb. per sq. in. with 24-in. O. D. pipe, formed of No. 12 gage sheets, to 470 lb. per sq. in. with 6-in. pipe made with No. 10 gage sheets. Weights per foot range from 6.88 lb. in the case of 6-in. to 62.83 lb. in the case

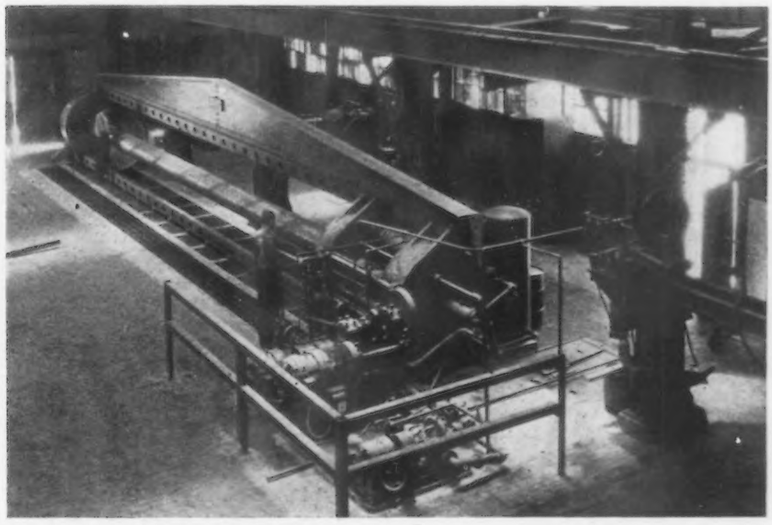
(*Concluded on page* 1877)

ARMCO SPIRAL WELDED PIPE

Outside Diameter, Inches	U. S. Std. Gage	Nominal Weight, Lb. per Lin. Ft.	Test Pressures, Lb. per Sq. In.	Working Pressures Lb. per Sq. In. Fiber Stress 10,000 Lb. per Sq. In. Safety Factor of 4
6	12	6.88	750	362
6	10	8.84	950	470
6⅝ *	12	7.59	650	328
6⅝	10	9.76	850	425
8	12	9.17	550	272
8	10	11.78	700	352
8⅝ *	12	9.88	500	252
8⅝	10	12.70	650	328
10	12	11.46	450	218
10	10	14.73	550	282
10	8	18.00	700	344
10	7	19.68	750	376
10¾ *	12	12.53	400	202
10¾	10	15.83	550	262
10¾	8	19.35	650	320
10¾	7	21.11	700	350
12	12	13.75	350	181
12	10	17.68	450	235
12	8	21.61	550	286
12	7	23.57	650	313
12	3	31.12	850	418
12¾ *	12	14.61	350	171
12¾	10	18.78	450	220
12¾	8	22.95	550	270
12¾	7	25.04	600	295
12¾	3	33.29	800	393
14	12	16.04	300	155
14	10	20.62	400	201
14	8	25.20	500	246
14	7	27.49	550	268
14	3	36.60	700	358

*Same as 6, 8, 10 and 12 inch standard I. D. Pipe.

Welding sections of spiral pipe in the field.



Each section of spiral welded pipe is tested on this hydrostatic machine. Tests are based on a fiber stress of 10,000 lb. per sq. in. and a safety factor of 4.

ARMCO SPIRAL WELDED PIPE

Outside Diameter, Inches	U. S. Std. Gage	Nominal Weight, Lb. per Lin. Ft.	Test Pressures, Lb. per Sq. In.	Working Pressures Lb. per Sq. In. Fiber Stress 10,000 Lb. per Sq. In. Safety Factor of 4
16	12	18.33	300	136
16	10	23.56	350	176
16	8	28.80	450	215
16	7	31.41	500	235
16	3	41.98	600	312
18	12	20.62	200	121
18	10	26.51	300	157
18	8	32.40	400	191
18	7	35.34	400	209
18	3	47.1[illegible]	550	278
20	12	22.91	200	109
20	10	29.46	300	141
20	8	36.00	350	172
20	7	39.27	400	188
20	3	53.36	500	250
22	12	25.20	200	99
22	10	32.40	250	128
22	8	39.60	300	156
22	7	43.20	350	171
22	3	57.59	450	228
24	12	27.49	200	90
24	10	35.35	250	118
24	8	43.20	300	142
24	7	47.13	300	156
24	3	62.83	400	208

Price Advances Essential to Recovery, Declares Foreign Trade Council

WITH the declaration that "an essential necessity of the present economic situation is an advance in commodity prices," the National Foreign Trade Council brought to a close its eighteenth annual meeting at the Hotel Commodore, New York, which James A. Farrell, its chairman, stated was the most successful convention this group of export traders has ever held. The attendance was about 2200, indicating the widespread interest in the purpose of the council, embodied in its slogan, "Greater Prosperity Through Greater Foreign Trade." There was evidence in the meeting of renewed recognition of the interdependence of nations through international trade and of the part which exports play in our domestic prosperity.

The declaration of the council was presented at the closing session Friday afternoon by Eugene P. Thomas, vice-president, United States Steel Corpn., and was patterned to some extent on opinions voiced by James A. Farrell, president, United States Steel Corpn., in his opening address as chairman of the National Foreign Trade Council. The declaration in full is printed in an adjoining column.

Following its presentation, Mr. Farrell commented as follows:

"The declaration of this convention is the keynote to prosperity, and, in my opinion, will mark the turn in business. It is already in evidence in many places."

No reference was made in any official statement of the council to the tariff question, which bobbed up frequently during the sessions. The present American tariff, which was attacked by some as too high, was also vigorously defended by Dr. Julius Klein, Assistant Secretary of Commerce.

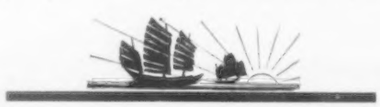
We Have Power to Lead in World Trade Recovery

In an address on the world trade outlook at the opening session, James A. Farrell, chairman of the council, said that "no one contemplating the vast resources of the United States; the basic soundness of our institutions; our financial and industrial integrity, which so powerfully has sustained our country in the perplexing and trying period through which we have been passing; our creditor position in the world; our unimpaired efficiency and economic strength and the splendid morale of our people, can have any doubt that we possess within ourselves the power to lead in world trade recovery."

Mr. Farrell said that an examination of the statistics of world trade for the last four or five years discloses that the recession in volume has not been nearly so great as in value. American exports of finished manufactures retain their key position as a stabilizing influence, showing the smallest decline in export values and constituting 50 per cent of our total sales abroad. After reviewing the economic and trade conditions of various parts of the world, particularly those sections which normally enjoy a large business with the United States, both import and export, Mr. Farrell said:

"All great wars leave legacies of unrest. It is not astonishing to find that the greatest war in human history did not entirely end with the armistice. The absence in China of a strong central administration; contemplated changes in India; governmental changes in Latin America; earthquakes in Japan and Nicaragua; failure of valorization schemes in a number of countries; depreciation of silver with the unfavorable repercussions in South America and the Far East; fixation of wheat prices in the United States and Canada—these factors are local in character in the main, and form an impressive commentary upon some of the causes contributory to world trade stagnation.

"It is difficult to draw a line between economics and politics, where one obviously reacts upon the other. While we must take into account all the factors that enter into our commercial relations with other countries, we shall gain a much clearer perspective in regard to our own position in world commerce by concentrating our attention upon the things it is possible for us to accomplish. We should avoid laying too much stress upon internal complications in other countries which it is not within our power to remove, but rather emphasize those things that lie within our own sphere of action.



World Has Gained by Chastening Discipline of Hard Times

"Whatever the losses sustained during the past two years, the world has gained materially by the chastening discipline of hard times. Demands have been made upon industry to repair defects in the economic structure; to abandon policies that violate fundamental laws, and to apply more scientific methods in overcoming obstacles to readjustment to new conditions. This housecleaning has been rendered necessary by the derangements of a war which caught the Western world in a transition stage between a nineteenth century industrial era dragging to its close, and the beginning of a new industrial revolution to which scientific research and invention had given birth on the American continent.

"To a very large extent our domestic market is the result, not the cause, of our industrial supremacy. If we have succeeded in building up a nation of 120 millions of people; in finding employment for the millions of European immigrants who have landed upon our shores, and in maintaining this large population in normal times on a higher scale of comfort than that of any other country, we must look for the primary cause, not to the area or population of this market, but that which really differentiates America from Europe industrially, the extent to which we have encouraged and utilized scientific research and inventive genius in the development of our natural resources and in the application to industry of the most efficient methods.

Opposes Impairment of Home Market by Lowered Living Standards

"So far back as 1918, the Balfour Committee reported to the British Parliament that the major problem

before that country was the lowering of costs through greater industrial efficiency such as the United States possessed. That is the problem which still confronts Europe. So let us not abandon the road which American industry has traveled so prosperously. Let us not contemplate with indifference any impairment of our home market by lowered standards of living. In a very real sense we take out of this home market only what we put into it.

"While it is vital to our prosperity as a nation to find a market overseas for at least 10 per cent of our total production, we should not forget the rock from whence successful foreign trade is hewn, the industrial foundations that have been so well and deeply laid in our home market. While our foreign trade must always be more susceptible to world conditions, it should be possible for us to discover means of making our domestic market a stronger stabilizing influence in periods of world depression. We have overcome great obstacles in the evolution of our present industrial system. Concentrated study and intense effort must in time bring equally satisfactory results in maintaining throughout the years a steady average of employment in conformity with our recognized standards of living. We cannot, even if we would, eliminate the human equation from industry. The happiness and contentment of 120 millions of people is the end toward which the wheels of industry turn. The more successful we are in making American industry serve the interests of our country and people, the greater the opportunity that awaits us of serving the interests of other peoples with whom we trade.

"We have been slow as a people to envisage our trade as national in scope and in its benefits. With the knowledge that our country must be prepared to meet keener competition in world markets, it seems unwise for individual States of the Union to continue imposing harassing regulations and legislative enactments that tend to impede the free course of transcontinental commerce. It has been well said that 'the participation of the State in the collective activities of the nation is essential for the higher development of the nation.' There can be no return to the early days of State trade wars without disastrous consequences to the nation at large. Thousands of State laws have been passed that serve to strengthen bureaucratic control of the nation's business. Experience conclusively shows that industry prospers best when the function of the State is confined to its legitimate task of removing all impediments to lawful business enterprise.

"The interdependence of agriculture and industry, the necessity of maintaining an economic balance between the two, must make us at all times sympathetic to any well considered plans for improving agricultural conditions. Fixation of prices without control of production is one of the root causes of the present world depression. Wherever tried it has wrought disaster. The troubles that beset so many countries today are self-imposed in their departure from established principles of economic development.

Sees No Adverse Effect from Present American Tariff

"There is much confusion of thought regarding our tariff schedule as a factor in our present trade recession. Seeing that the unfavorable conditions apply indiscriminately to all countries, low tariff, high tariff and free trade alike, it must be obvious that tariff discussions between opposing schools of thought are of academic interest only, in a period that calls for early adjustment of our difficulties. To those who complain that American trade has suffered through the present tariff law, I need only point to the fact that similar complaints were made concerning the effects of the lower tariff schedule of 1913. In neither case has the existing law availed to prevent a business slump. In 1914, under a low tariff, we entered upon a period of trade stagnation which was only relieved by the abnormal demands of war. In 1930, with a higher tariff, trade fell off. On which side shall we elect to stand? Obviously we must look to other causes as the major factors which have tended to disturb the balance between production and consumption throughout the world.

"The problem of European countries would be much more critical today were it not for our readiness to absorb the thirteen million immigrants who landed in the United States between 1901 and 1914, and the millions who followed at the end of the war. When we estimate the causes of our unemployment, including excess immigration, and our responsibility to the world as a creditor nation, we should not overlook the part our country is now playing in carrying a large share of Europe's burden of unemployment.

Advance in Commodity Prices Essential to Recovery

"An essential requirement of the present economic situation is an ad-

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PROFITLESS MERCHANDISING RETARDS PROSPERITY

THE most significant fact in the status of the international trade of the world is that the volume of merchandise sales about equals that of a few years ago when business was enjoying substantial prosperity. But price levels have fallen to the point where profit has been largely eliminated. The chief factor of the present situation is profitless merchandising.

An essential necessity of the present economic situation is an advance in commodity prices. When prices are falling, buyers tend to withdraw from the market. It is rising prices that stimulate buying and consumption and a return of prosperous times. Anything, therefore, which tends to postpone recovery in commodity prices, more especially those influences which are unfair and uneconomic in character, should be discontinued.

The importance of fair prices cannot be overestimated in influencing the restoration of trade. Sellers cannot expect to obtain fair prices for their own products unless, as buyers, they are willing to pay fair prices for the commodities and services to their industry. Competition is unfair both to industry and to the community when price cutting compels the sale of goods at a loss. Basic commodities are being sold at cost or less. Profitless merchandising retards prosperity and affects the position of the wage earner.

Our foreign trade is susceptible to world conditions, but it should be possible to stabilize our domestic market, which would have a strong stabilizing influence in other countries.

No one contemplating the vast resources of the United States; the basic soundness of our institutions; our financial and industrial integrity, which so powerfully has sustained our country in the perplexing and trying period through which we have been passing; our creditor position in the world; our unimpaired efficiency and economic strength and the splendid morale of our people can have any doubt that we possess in ourselves the power to lead in world trade recovery.—*Declaration of National Foreign Trade Council.*

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vance in commodity prices. When prices fall, buyers withdraw from the market. It is rising prices that stimulate buying and consumption and a return of prosperous times. Anything, therefore, which tends to postpone recovery in commodity prices, more especially those influences which are unfair and uneconomic in character, should be discountenanced at the present time.

"The importance of fair prices cannot be overestimated in determining the influences favorable to an advance in commodity prices and the restoration of trade. Competition is unfair to industry and to the community when price cutting has the tendency, as in all uneconomic activities, of taking the form of profitless merchandising.

Decries Talk of "Malign Influence of the Machine"

"We have heard much lately of the malign influence of the machine upon our modern civilization. How easy it is, by the mere reiteration of a phrase sometimes, to excite the prejudice of the unthinking and uninformed. The machine is the creation and the servant of man. It can only be transformed into a Frankenstein when man ceases to be intelligent, inventive and resourceful. There are some who still cling to oil and gas in preference to electric light; who ignore the usefulness of the telephone. Others, more progressive, find satisfaction and enjoyment in the employment of inventions that ease human burdens and minister to human pleasures.

"Someone has said that there is no field of human activity in which ideals are of more value than in business. American genius in industry is not wholly materialistic and quantitative in expression. It is highly qualitative when properly estimated in relation to the service rendered. The benefits of mechanical aid in every department of life so completely encompass us as to admit of no return to an age when these mechanical inventions were unknown. We can no more rid ourselves of this mechanical aid to a more spacious life without injury to our civilization than we can hope to cure a disease by killing the patient.

"The most economical use of machinery is always found where those who operate it enjoy a fair standard of living and comfort. It is not without significance in this connection that it is in those manufactured products which yield highest wages that we find in increasing proportion the mainstay of our foreign trade. No one grasping the full import of the relation of our foreign commerce to national well-being can fail to appreciate the importance of a right sense of proportion in the discussion of problems inherent in our industrial system."

Gloom Is Thickest in America

Thomas W. Lamont, partner of J. P. Morgan & Co., who addressed the opening session of the convention as chairman of the New York reception committee, said that upon his return recently from a brief trip abroad he was surprised and impressed by the fact that in no country that he visited in Europe was the gloom quite so thick as here in America.

"I hardly have to say to you," said Mr. Lamont, "that the most prosperous country of Europe has not the optimistic outlook for the future that America has, yet I find this feeling here. We all know that the depression that we are passing through has been severe and has been long continued, and yet it would appear that there is a new set of philosophers—some of our fellow-citizens who think that our difficulties are so great that we are never going to get through them. You recall that two or three years ago we had a school of philosophy that declared that the prosperity in this world of ours would never cease for even an instant.

"Now there seems to be another school that has gone just as far the other way in pessimism, just as those men went too far in the way of optimism. Yet I hardly have to recall to you that there is no justification for such feeling, for the establishment of any such philosophy, to the effect that our problems are insoluble. Do not let us for a moment get in mind the idea that our problems today are unprecedented or that they are insoluble. We know perfectly well that the way back is an arduous one; we will have to have a long trek perhaps to complete prosperity again. We have to do everything in the way of hard work and careful thought and to maintain a tolerant attitude and opinion toward every section and every body of men in order to get back. But don't for a moment let us get this idea, as I say, that these problems are i n s o l u b l e. There is no analogy or fact for any belief like that.

"Difficulties? Yes, the American people are facing difficulties—but impossibilities, never.

"I won't venture to give advice to a body of men so thoughtful and so experienced as these that are before us. There is one point, however, that I would emphasize again, and that is, let us discourage attempts to erect artificial barriers against our foreign trade. If we want that trade to prosper, we have got to bear in mind that we must make it as easy as possible. Some of our fellow-citizens at times are apt to think we can do all the selling and make the other fellow do all the buying. That has never been true, and it is not true today. That is the only word of caution I would utter to all of us here—to discourage every intention to build up these false barriers.

"The adversity through which we are passing will pass. It will go. Prosperity will come—contentment—happiness, will all come back, but only if we face the facts as men are accustomed to face the facts, and only if we have the intelligence and courage as you have in a superabundant degree—only if we have the patience and courage and intelligence to meet the facts and to handle them."

Declares American Tariff Is Not Hampering Export Trade

Dr. Julius Klein, Assistant Secretary of Commerce, in an address to the Export Managers Club at a dinner Thursday evening, declared that the present American tariff is not hampering export trade. "It is true," said Dr. Klein, "that our imports from Europe have fallen off very seriously, but it will be difficult indeed, for even the most ardent partisan, to prove that this decline is directly attributable to the tariff. On the contrary, there is abundant evidence to indicate that the shrinkage of our buying power as a result of the depression cut deeply into our demands for many European specialties. This fact is clearly indicated by the comparisons of curtailments of our free and dutiable imports during the first quarter of this year as against the corresponding period in 1930. Whereas the incoming European wares subject to duty fell off 33 per cent in that time, those coming in free of all duties declined 41 per cent.

"A conspicuous illustration of this is found in the case of Czechoslovakia. We were told that the recent drastic increase in the Czech duties on automobiles, which fell peculiarly severe-

PROBLEMS OF DEPRESSION ARE NOT INSOLUBLE

"DO not let us for a moment get in mind the idea that our problems today are unprecedented or that they are insoluble. We know perfectly well that the way back is an arduous one; we will have to have a long trek perhaps to complete prosperity again. We have to do everything in the way of hard work and careful thought and to maintain a tolerant attitude and opinion toward every section and every body of men in order to get back."

Thomas W. Lamont

ly on American cars, was a direct reprisal for the impairment of our imports of Czech wares through tariff increases. As a matter of actual fact, comparing the first quarters of 1930 and 1931, our imports of her dutiable wares fell off 7 per cent, whereas purchases of non-dutiable commodities lying entirely beyond the tariff obstacles fell off 96 per cent. Similar illustrations could be cited in the case of our imports from a number of other European countries."

Senor Don Manuel E. Malbran, Ambassador from Argentina to the United States, who addressed the foreign traders on Thursday, declared that the American tariff is prohibitive. He cited the case of linseed, the tariff on which has been revised 20 times upward, and yet, he declared, the United States produces less linseed now than in 1921 when the tariff was one-third as high.

Dr. Klein suggested the organization of an export-planning body, composed of representatives from the various groups which are prominent in export trade. He said that such a planning body could serve as a board of strategy and smooth out the host of obstacles which in many instances are too formidable for individual companies to overcome.

Banking Policy Important in Extending our Foreign Trade

Eugene P. Thomas, vice-president, United States Steel Corpn., in an address on "European Government Attitude Toward Foreign Trade," reviewed the recent steps that European governments have taken to stimulate the foreign trade of their countries. He said that insofar as these changes affect international competition in trade, and tend to place the American exporter at a disadvantage in world markets, it is to our interest to discover in what direction we may improve our facilities, and how we can best adjust ourselves to these new conditions.

"In a greater degree than yet experienced," said Mr. Thomas, "the American exporter is confronted with world competition more highly collective in character—competition now largely organized and financed through governmental channels." To offset the disadvantages imposed by paternalistic methods of other nations, Mr. Thomas said that the United States must not only increase its investments abroad, but must, in making loans, provide for the expenditure of the proceeds in this country so far as practicable.

"In normal times," said Mr. Thomas, "bankers should not be asked to impose conditions on foreign borrowers which would interfere with the free movement of credit, but these are not normal times. Our competitors have shown no disposition to follow our example in this respect. Loans are made by foreign bankers with a view chiefly to the effect upon the interests of their own country. With competition keener, and with the necessity imposed upon us of restoring our trade abroad, the policy of the investment and commercial banker in the matter of loans and foreign investments is an important factor in relation to our foreign trade, and should engage our most serious consideration."

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PROFITLESS MERCHANDISING UNFAIR TO ALL

"THE importance of fair prices cannot be overestimated in determining the influences favorable to an advance in commodity prices and the restoration of trade. Competition is unfair to industry and to the community when price cutting has the tendency, as in all uneconomic activities, of taking the form of profitless merchandising."

James A. Farrell

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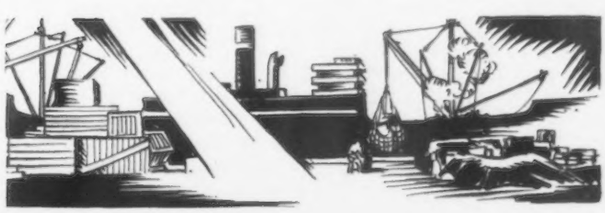
Much Material Handled in South Works Program

Many interesting facts surround the story of the construction program recently completed at South Works of the Illinois Steel Co., Chicago. To provide a site for the major installations it was necessary to remove a slag bank containing 5,000,000 tons of material and covering about 175 acres. Removal was begun in May, 1929, and practically finished in October, 1930. When this work reached its peak, 17 steam shovels, 25 railroad locomotives and about 550 cars were employed, removing 22,000 tons of slag a day.

It is estimated that the construction program required the labor of 30,000 men for 18 months. Approximately half of the men were employed in the Chicago district, and the others at numerous points where materials and machinery were prepared and manufactured.



The area of the ground where the improvements were made is 210 acres. A total of 52 acres is under roof. The areas of some of the larger buildings are: beam mill, 18.9 acres; No. 4 openhearth building, 14.4 acres; plate and slab mill, 12.6 acres; alloy mill, 5 acres.

Excavation above grade called for the removal of 4,000,000 tons, while removal below grade was approximately 1,000,000 tons. The foundations required 465,000 cu. yd. (930,000 tons) of concrete, 2,250,000 bags of cement having been used. The maximum amount of concrete placed in a single day was 3150 cu. yd.

Total steel erected was 100,056 tons, the maximum in a single day having been 1465 tons. The maximum steel erected in a month was 19,889 tons. The American Bridge Co. used 22 locomotive cranes for steel erection and the Illinois Steel Co. had 26 cranes in use on other work. Roofing and siding called for 3,530,000 sq. ft. of corrugated steel sheeting, this being equivalent to 4500 tons.

Standard-gage tracks installed were as follows: temporary, 30 miles, and permanent, 37 miles; while 12 miles of narrow-gage track was laid. This makes a total trackage of 79 miles.

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"Stabilized Production Must Be Accepted"

"Industry must understand and accept the theory of stabilized production. It must recognize the folly of attempting to operate a plant on a basis of 100 per cent capacity output when statistics indicate a demand of but 50 per cent of plant capacity," said Charles F. Abbott, executive director of the American Institute of Steel Construction, in an address to the National Lime Association at White Sulphur Springs, W. Va.

Mr. Abbott further said that industry must overcome the opportunity of selfishness which induces some to enter into a war of price cutting in an attempt to attain a higher level of operations.

"Unless our price cutting is stopped," he said, "and prices are advanced to the point where they will show a reasonable profit, then wages must be reduced, increasing the volume of unemployment. Wage scales cannot be maintained and the unemployment problem cannot be solved unless profits can be realized.

"Nothing is so easy as to cut prices, and nothing is so hard as to get them back when once they have been pulled down. Any fool can cut prices, but it requires the combined power of the industry to put them back again. There is only one way to make money in business. That way is to sell the product at a profit. The fact that there are many in every line who are making a profit proves that knowledge and self-restraint are not without their rewards."

CLARENCE L. COLLENS

Electrical Manufacturer Argues for Stabilization of Prices

President, National Electrical Manufacturers Association, Says It Will Help Both Buyer and Seller

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IN an address to the Cleveland Association of Purchasing Agents, Clarence L. Collens, president, Reliance Electric & Mfg. Co., Cleveland, and president, National Electrical Manufacturers Association, said:

"I would like to see price stabilization, whether I am a buyer or seller, promoted in every industry in the United States. Price stabilization, provided the market levels are fair and economic and always reflect fundamental and long-time changes in costs, will greatly simplify the problems of the buyer, will increase the efficiency of both buying and selling, eliminate wasteful destructive competition, promote normal flow of trade at all times, and, because the interests of all are so intricately interwoven with the soundness of our business structure, promote the economic and social welfare of all classes of our citizenship."

Although Mr. Collens' remarks would apply to the price situation at any time, they are particularly pertinent at the moment because of the persistent price cutting that has been going on in many lines of industry.

Determination of "Right" Price Calls for Careful Consideration

"To be mutually satisfactory, the relations between buyer and seller require a meeting of minds on three important considerations—price, quality and service," Mr. Collens said. "The major consideration discussed here is the question of price, as it is assumed that the price agreed upon or accepted is right for the quality furnished and the service rendered.

"The determination of the right price between buyer and seller on a single negotiation may seem a simple transaction in itself, but in the aggregate it is the final effect and result of millions and millions of such transactions that — eliminating the current effect of business cycles—determines the economic welfare of whole industries and ultimately of the nation as a whole, for behind every transaction lies the economic welfare of the stockholders on both sides and of employees, the ability to maintain dividends on the capital invested and to pay fair wages and salaries. The aggregate of such transactions determines the aggregate purchasing power and is intimately interwoven with our social structure and our standards of living.

"Of course, there are other factors involved, the efficiency of management, modernization of methods, products and equipment, and the continual effort to reduce costs and improve productivity per man. No structure can be set up that holds an umbrella over inefficiency either of production or distribution. The extra marginal producer must drop by the wayside. But assuming efficiency, assuming that each productive unit is doing its share toward the lowering of costs either of production or distribution, and is so doing its share toward the maintenance of high wages, high purchasing power and high standards of living, we then get back to the original premise—that it is the basis on which commercial transactions are carried on that really determines our economic and social welfare.

Public Is Becoming More a Part of the Business Structure

"More and more is the public becoming a part of our whole economic and business structure, not only as employees and salaried workers, but also as stockholders. No longer do we find the one-man business, but are gradually drifting to bigger and bigger units with hundreds of thousands of small stockholders. Those having capital are no longer a small privileged class, but all classes of our citizenship are now investors. We find drives for employee stock ownership and for customer stock ownership and can no longer divorce the economic welfare of our business organizations from the economic and social welfare of the people as a whole.

"And, it is becoming increasingly difficult to divorce the interest of the buyer and the seller, for we are all both producers and consumers, and it is, therefore, important that the commercial transactions, both individual and in the aggregate, protect the interests of both.

"This again brings us back to the economics and equities of individual commercial transactions. What policies should we promote so that the interests of both may be protected and by so doing assist in protecting the economic and social welfare of the country as a whole?

"How can the right price and a fair price be determined? To what extent should each transaction be a matter of barter and bargain? To what extent should the elements of speculation enter into commercial transactions?

Competition May Be of Two Kinds

"The American people have indorsed the principle of competition and will continue to indorse that principle, but competition may be of two kinds, one economic, the other destructive. On all sides we find tendencies toward stabilization in all its phases, the elimination of destructive competition and of all unfair methods of buying and selling. Does this tendency conflict with the principle of competition? I think not, for market levels will always be set by competition, but my viewpoint of stabilization, insofar as prices are concerned, means simply the elimination of the element of speculation and of barter and bargain on each individual transaction and the maintenance of firm price policies. This is especially necessary in respect to standard commodities and products generally sold.

"It is self-evident that the determination of the right price on products or services which are special and on which cost has to be figured for each specification, such as an engineering or building project, a special machine, etc., is an entirely different proposition from articles or services for which there is a regular and general demand. There are no market levels for such projects, although there may be market levels for many

(*Concluded on page* 1878)

PRICE VERSUS COST

NO doubt, prices are too low to afford a profit in many lines of business. Those who sell are to blame for this; not those who buy. Companies that are stampeded by competition into slashing prices to a level below cost overlook the fact that there is a law against this practice. It is not a man-made law which may be circumvented by sharp practice, but an economic law which inevitably exacts its penalties. Severe penalties, too, the mildest being the dissipation of assets.

Even though prices are too low, it is a Herculean job to raise them at a time like the present. Shrunken pay envelopes, red ink statements, and passed dividends won't underwrite higher prices. Nor will higher prices capture and hold foreign markets for American products.

Cost reduction provides the one sound and safe leverage to lift industry and business out of this depression level. The sooner that, individually and collectively, we cease chasing economic will-o'-the-wisps, and follow the safe beacon light of cost reduction, the sooner we will regain economic "terra firma."

Cost reduction is the one way to compensate for the loss of purchasing power. It is the one way to the capture and holding of export markets. It is the one feasible way to the reestablishment of the vanished profit margin.

Companies which establish minimum cost levels in their industries will have nothing to fear from the future. They will command adequate volumes and profits.

Increasing volumes, in industry, bring their own economies. But today the need for a living profit demands the achievement of economies in spite of decreased volumes. Only by increasing the efficiency of production can these ends be obtained.

Many concerns are postponing the purchase of improved manufacturing equipment until their volumes "pick up." What a mistaken policy! It is when volumes decrease that the proper replacement of machinery will do them the most good.

The profitable employment for idle funds and credit today is in securing minimum cost levels through the modernization of industrial equipment. American industry needs the best tools available to accomplish the task that lies ahead of it.

By
JOHN H. VAN DEVENTER
Industrial Consultant
The Iron Age

Copies of this insert may be secured from the Reader Service Department of THE IRON AGE, 239 West 39th Street, New York

Previous recent editorials in this series appeared in the following issues of THE IRON AGE: March 12, March 19, April 9, April 16, April 23, April 30, May 7, May 14, May 21, May 28, 1931.

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NOT SO BAD

JAMES A. FARRELL, at the Foreign Trade Convention, emphasized the fact that our recession in export dollar values has been much greater than the recession in volumes. Finished manufactures in particular have stood up well in world trade, and now constitute 50 per cent of our trade abroad. Our exports of finished products have been steadily gaining in their proportion to the whole.

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TARIFF

ACCORDING to Dr. Julius Klein, Assistant Secretary of Commerce, the tariff has not been to blame for the noticeable falling off in our imports. "This fact is clearly indicated," says he, "by the comparison of curtailments of our free and dutiable imports during the first quarter of this year as compared with the corresponding period of 1930. Whereas the incoming European wares subject to duty fell off 33 per cent in that time, those coming in free of all duty declined 41 per cent." The value of tariffs and other things is best tested perhaps by how they work during normal times, not by how they do not work during abnormal times.

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FOREIGN LOANS

EUGENE P. THOMAS, vice-president, United States Steel Corpn., pictures the increasing difficulties faced by American exporters because of highly organized and government-financed competition abroad. "United States, to offset these paternalistic methods, must not only increase investments abroad," states Mr. Thomas, "but must provide, so far as possible for the expenditure of the proceeds in this country."

AMERICAN BLUES

"THE most prosperous country in Europe," says Thomas W. Lamont, "has not the optimistic outlook that America has, yet no where else is the gloom quite so thick as it is here." Perhaps that is because America is so young; youth is always more mercurial in temperament than is old age. Perhaps after we arrive at maturity, we will settle down to facing things, even such unpleasant ones as depressions, with more complacency. Gloom never "butters any parsnips."

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BEARS TO BLAME

AMONG the economic crimes of the stock market bears, who are now profiting by the professional spreading of gloom, is the recent perceptible slackening of retail automobile sales. June was headed for a good record of motor car production until the new market lows made their appearance. A decline in the rate of car buying was almost immediately noticeable following the break. Too bad that Americans take gambling so seriously. The business situation is not quite so bad as the stock market paints it.

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Also in This Issue—

First Session of Hartford A.S.M.E. Meeting

Proceedings of National Foreign Trade Council

The Week's Developments in the Automobile Industry

British Steel Mills Operating at 25 Per Cent

Steel Exports Down; Imports Up

Wage Cuts in European Plants

Government Revises "Survey of Business"

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CONSUMER GOODS

SO-CALLED "consumption goods," or products of repetitive purchase by average consumers are usually the first to feel the effects of a depression and the first to recover from it. They "react" much more quickly than the more complicated engineering products and equipment. An encouraging sign in the expansion of demand for consumer goods is noted by W. L. Cooper, director of the Bureau of Foreign and Domestic Commerce. Citing the fourth consecutive gain in the seasonally adjusted index of production, in April, Mr. Cooper states that the improvement is due to industries producing consumer goods. Let us hope that this is a reliable harbinger of better days for all industry.

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PRICES

"ANY fool can cut prices," says Charles F. Abbott, executive director of the American Institute of Steel Construction, "but it requires the combined power of the industry to put them back again." Prices that fall too fast are, like Humpty Dumpty, difficult to build up again. Prices should never fall below cost but many of them are in that position now. That is converting business into charity, harming many and benefiting no one. Clarence L. Collens, president, National Electric Manufacturers' Association, also discussing the price situation, adds the thought that "behind every transaction lies the economic welfare of the stockholders on both sides and of the employees; the ability to maintain dividends on the capital invested and to pay fair wages and salaries." How many think of this when slashing prices?

Employment Uptrend in Midwest Checked

April data of establishments reporting in the seventh district disclose a reversal of the slight upward trend in manufacturing employment and payrolls which obtained during February and March, according to the report of the Federal Reserve Bank of Chicago. The movement in manufacturing and non-manufacturing aggregates and in the individual groups correspond roughly to the trend recorded in April of last year, indicating an interruption of the spring expansion in factory employment schedules coinciding with the seasonal upturn in other industries, particularly construction and the utilities.

Of the six manufacturing groups which reduced both number of men and payrolls, the most significant declines were chemicals, metals and textiles. Coal mining was the only non-manufacturing group which reduced operating schedules. The vehicles group made its third gain in April.

The ratios of applicants to positions available at free employment offices were lower in April in all four States reporting the data. These data represent continuous improvement during several months in Illinois, Indiana and Wisconsin, while in Iowa the highest ratio of the depression period was reported for March.

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Empire Steel Corpn. in Receivership

The Empire Steel Corpn., Mansfield, Ohio, was placed in the hands of a receiver by Federal Judge Samuel H. West, Cleveland, May 28, in proceedings brought by the Interlake Iron Corpn., Chicago. Carl H. Henkel, president of the company, was named receiver. The petition asked judgment for $477,762 for pig iron furnished by the Interlake Iron Corpn. A few days previously Youngstown and Niles, Ohio, banks took judgments against the corporation for $398,578 on past due cognovit notes, precipitating action by other banking creditors, and leaving the company without working funds. Receivership was agreed upon by creditors.

The company has current liabilities of approximately $2,000,000 in addition to its bonded indebtedness of $3,200,000.

Last March the stockholders approved a plan of financial reorganization, which required the subscription of $1,000,000 of new capital by stockholders, but the plan failed through lack of general support of stockholders in subscribing for the bonds. In 1929 and in prior years the corporation incurred heavy bank loans which it has not been able to meet through earnings. The petition states that because of the long business depression earnings have been reduced for more than a year, but that assets are sufficient to pay liabilities if properly administered and in the event of hoped-for change in industrial conditions there should be something left for the stockholders.

The company was organized by W. H. Davey in December, 1927, with $7,430,200 cumulative 7 per cent preferred stock outstanding and a common stock issue, which later was increased to 273,000 shares. On March 1, 1928, it absorbed the Falcon Steel Co., Thomas Sheet Steel Co., Waddell Steel Co., Niles, Ohio; Empire Steel Co., Cleveland; Mansfield Sheet & Tin Plate Co., Mansfield, and the Ashtabula Sheet Steel Co., Ashtabula, Ohio. The company was managed by the seven Davey brothers, W. H. Davey having been chairman of the board until November, 1930. Early in that year a reorganization was effected, the Davey interests, amounting to about 14 per cent of the common stock, having been purchased by the Interlake Iron Corpn., affiliated with Pickands, Mather & Co. interests in Cleveland. Paul Llewellyn, formerly of the Interstate Steel Co., Chicago, was made chairman and Mr. Henkel president.

The company has an annual ingot capacity of 330,000 tons and a capacity of 486,000 tons of black sheets.

Mr. Henkel in a formal statement said that he asked authority of the court to continue operations and he is hopeful that some plan of reorganization may be effected and some of the properties turned over to a reorganized company as going concerns.

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"Perm-Brite" a New Aluminum Alloy

A late development after years of research in the laboratories of the Apex Smelting Co., Chicago, is the new aluminum alloy sold under the name of "Perm-Brite." This alloy is reported to be radically different in composition from aluminum alloys now in common use. The specific gravity is under that of pure aluminum, aluminum alloys of the silicon group, and is almost 10 per cent lighter than No. 12 alloy. The weight per cubic foot is 163 lb. The high strength attainable is indicated by tests in sand cast specimens ranging from 24,000 to 26,000 lb. per sq. in. It is extremely ductile, and has an elongation of from 6 to 8 per cent in 2 in. in sand castings, and up to 23 per cent in the rolled state, according to the company.

Combined with its light weight and high strength are added factors of corrosion resistance and fine surface. It lends itself readily to polishing and plating. The alloy is adapted to sand and die castings, and it can be rolled, forged, drawn, hot and cold worked.

New Alloy Developed for Gray Iron Castings

A new alloy of zirconium, manganese and silicon has been developed which is claimed to increase the strength of gray iron castings without affecting their machinability. Tensile, transverse and hydrostatic tests are said to have proved that the treatment of cast iron with this alloy leads to a better grade of casting.

Laboratory tests of tensile and transverse strengths of numerous specimens indicate that consistently high values may be expected. A series of coupons, having in each case a cross-sectional area of 1.12 sq. in., showed an average tensile strength of 34,000 lb. per sq. in., while the actual values ranged from 29,100 to 37,950 lb. The hardness figures varied between 212 and 228 on the Brinell and from 96 to 99 on the Rockwell, B scale. In every instance a good, gray iron, fine mottle fracture occurred ½ in. from the center.

Transverse tests on untreated bars, 1 in. sq. and 12 in. between centers, showed an average strength of 3700 lb. per sq. in. and a deflection of 0.153 in. Bars treated with zirconium-manganese-silicon had a maximum strength of 4200 lb. per sq. in. and an average strength of 3770 lb., with an average deflection of 0.154 in. Treated bars, 1¼ in. in diameter, showed an average transverse strength of 4900 lb. per sq. in. and a deflection of 0.165 in.

In hydrostatic tests on 12-in. gate valves, the average pressure to cause failure is about 700 to 800 lb. per sq. in. In fact, 800 lb. per sq. in. may be considered as high. Tests made by a leading valve manufacturer developed 900 lb. per sq. in. pressure before the treated valve failed. The figures for ordinary 8-in. globe valves run between 1700 and 2000 lb. per sq. in. A valve treated with this new alloy went to 2300 lb. per sq. in. before failing.

The results of these tests, it is claimed, coupled with the ready machinability of the metal, indicate that the addition of this zirconium-manganese-silicon alloy to gray iron results in better castings. Greater dependence can be placed on higher strengths and more uniform performance.

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Fabricated Steel Plate Orders Off in April

WASHINGTON, May 29.—Bookings of fabricated steel plate in April totaled 29,916 tons, compared with 31,056 tons in March, according to reports from 51 manufacturers received by the Bureau of the Census. The April orders were distributed as follows: Oil storage tanks, 7749; refinery materials and equipment, 2059; tank cars, 778; gas holders, 1522; blast furnaces, 25; miscellaneous, 17,783.

River Movement of Steel Fell Off in April

Movement of iron and steel products on the Ohio River in the Pittsburgh district during April amounted to 91,570 net tons, according to the figures of the United States Engineer office, Pittsburgh. This compares with 104,792 net tons in the preceding month, and with 66,482 tons in the corresponding month last year. April river commerce on the Monongahela River amounted to only 57,751 tons, as compared with 76,137 tons in March and 70,229 tons in April, 1930. On the Allegheny River 1250 tons was moved in April, compared with 1000 tons in the corresponding month last year. There was no steel movement on this river in March.

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Iron Ore Mined in 1930 58,408,664 Gross Tons

Iron ore mined in the United States in 1930 amounted to 58,408,664 gross tons, a decrease of 20 per cent as compared with 1929, according to figures compiled by the United States Bureau of Mines. Compared with the average for the preceding five years, the production in 1930 was smaller by 11 per cent. The shipments of iron ore in 1930 amounted to 55,201,221 gross tons, valued at $145,619,059, a decrease of 27 per cent in quantity and of 26 per cent in total value, as compared with 1929. The average value per ton of iron ore at the mines in 1930 was $2.64, as compared with $2.61 in 1929. The stocks of iron ore at mines at the end of 1930 amounted to 10,383,152 gross tons, an increase of 47 per cent.

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Government Survey of Business Revised

WASHINGTON, June 2.—In an effort to make it of maximum value to the business men of the country and to others engaged in studies of economic changes, the Department of Commerce has revised its Monthly Survey of Current Business. The publication will contain monthly business statistics on some 2000 items, arranged alphabetically and running back 13 months, and weekly business statistics for the latest weeks with yearly comparisons. The data will be supplemented by 25 pages of interpretative text and diagrams.

In explaining the new editorial policy of the publication, W. L. Cooper, director of the Bureau of Foreign and Domestic Commerce, said that editors, publishers, business executives, Government officials and many others experienced in the use of statistics have extended whole-hearted cooperation.

Mr. Cooper stated that information contained in the revised publication shows that recent improvement in several lines of trade and industry justifies the belief that the first quarter of 1931 marked the turning point in the prolonged decline in business, which began nearly two years ago.

It was stated that the seasonally adjusted index of factory production computed by the Federal Reserve Board, reflecting the combined output of the leading manufactured products, in April, showed the fourth monthly gain, with an advance of 11 per cent from the low of mid-winter.

"This expansion of factory output is not attributable to the iron and steel, construction, and heavy equipment industries, which have continued at low ebb, but to improvement in industries producing finished goods for consumption, notably food products, textiles, leather and shoes and automobiles," said Mr. Cooper.

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Gray Iron Castings Orders Lower in April

A slight decline in business in gray iron castings during April is shown by the monthly report of the Gray Iron Institute, Cleveland. Reports indicate a production of 58.2 per cent of normal, compared with 60.4 per cent in March. New business was 60.9 per cent of normal, compared with 66.9 per cent during the previous month. Unfilled orders declined to 43.7 from 47 per cent in March.

Production in the district including Pennsylvania, Michigan, Ohio, Indiana and the area to the south and west of the Mississippi River showed a gain, having been 63.2 per cent of normal, against 62.6 per cent the previous month. The Chicago district also showed a gain, at 60.3 per cent, against 58.5 per cent the previous month. The territory including Wisconsin and Illinois and the district west of the Mississippi River produced 57.1 per cent of normal in April, against 63.1 per cent in March.

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Steel Castings Orders Declined in April

WASHINGTON, May 29.—Orders for commercial steel castings in April declined to 45,671 tons, against 48,159 net tons in March, according to reports received by the Department of Commerce from 131 producing establishments. Production in April dropped to 48,298 tons from 56,730 tons in March.

IRON ORE MINED IN THE UNITED STATES, 1929-1930, IN GROSS TONS

(Exclusive of ore containing 5 per cent or more of manganese)

State	1929	1930
Alabama	6,453,075	5,738,478
Arizona	.....	923
California	303	.....
Colorado	50,754	32,247
Georgia	59,316	52,221
Michigan	15,456,397	13,544,277
Minnesota	45,760,858	34,517,748
Missouri	168,934	132,749
New Jersey	281,327	394,639
New Mexico	171,585	173,432
New York	822,261	889,405
North Carolina	30,675	100
Pennsylvania	1,092,013	964,638
Tennessee	102,171	27,710
Utah	[a]324,985	279,118
Virginia	.....	19,596
Washington	5,018	.....
Wisconsin	1,608,571	1,321,360
Wyoming	639,477	320,023
	73,027,720	58,408,664

[a] Revised figure.

IRON ORE MINED IN THE UNITED STATES, BY MINING DISTRICTS AND VARIETIES, 1929-1930, IN GROSS TONS

(Exclusive of ore containing 5 per cent or more of manganese)

1929	Hematite	Brown Ore	Magnetite	Carbonate	Total
Lake Superior [a]	62,824,768	.....	.....	....	62,824,768
Birmingham	5,814,143	467,422	.....	....	6,281,565
Chattanooga	81,524	74,429	.....	....	155,953
Adirondack	.....	.....	[b]749,976	....	[b]749,976
Northern New Jersey and southeastern New York	.....	.....	353,612	....	353,612
Other districts	[bc]1,128,796	[c]233,759	1,297,516	1,775	[b]2,661,846
	[bc]69,849,231	[c]775,610	[b]2,401,104	1,775	73,027,720
1930					
Lake Superior [a]	49,382,652	.....	.....	....	49,382,652
Birmingham	5,151,089	400,595	.....	....	5,551,684
Chattanooga	326	73,925	.....	....	74,251
Adirondack	.....	.....	[b]833,225	....	[b]833,225
Northern New Jersey and southeastern New York	.....	.....	450,819	....	450,819
Other districts	[bc]731,887	[c]245,976	1,137,167	1,003	[b]2,116,033
	[bc]55,265,954	[c]720,496	[b]2,421,211	1,003	58,408,664

[a] Includes only those mines in Wisconsin which are in the true Lake Superior district.

[b] Some hematite from "Other districts" included with magnetite from Adirondack district.

[c] Some hematite included with brown ore.

Rise in Retail Sales of Automobiles Halted as Stock Market Slumps

DETROIT, June 1.

ONE of the aftermaths of the most recent dip in the stock market has been a perceptible slackening in retail automobile sales. In fact, the decline in orders was noticeable almost immediately after the break in stocks and has continued scarcely without interruption. There is little doubt among automobile executives that the nervousness incident to the further drop in stock prices was the major factor in halting, at least several weeks in advance of expectations, the rise in motor car sales. There is still hope that the downward trend in automobile buying will not only be arrested, but will be succeeded by another upward movement before seasonal influences become dominant. This hope is given support by the experience of one of the larger automobile companies, which reported an increase in retail sales the past week following two weeks of lessened demand.

An examination of the retail trade, based on new car registrations, brings to light some interesting facts. Compared with 1928, 1929 and 1930, sales this year have been much better in the Northern than in the Southern States. One can start at the Canadian border and come southward, finding progressively poorer sales until the worst conditions are encountered in the so-called cotton States. The only exception centers in the heart of the automobile producing section itself—Michigan, Ohio and northern Indiana—where registrations have been relatively as much off from normal as in the cotton belt.

New England presents the most cheerful picture in the country, with Maine and New Hampshire leading the 48 States in percentage of new cars. Massachusetts is not far behind, while New York is high on the list. Minnesota likewise seems more prosperous than its neighbors, if new car orders can be taken as an index of prosperity. California also has made a good record. Sales for the entire country are running on the average about 70 to 75 per cent of those in 1930. Some automobile manufacturers believe that this ratio to last year's performance may get higher in the last half; on the other hand, others are not so sanguine.

Increased loans to World War veterans by the Government have had a stimulating effect on retail automobile sales. In many States direct checks have been made by manufacturers, proving that numerous orders have been placed solely on the strength of so-called bonus money. These loans also have been responsible for keeping down the percentage of repossessions. It is said that automobile finance companies secured lists of veterans receiving money and checked them against their customers, who were then solicited for back payments before they had an opportunity to spend their new funds for other purposes.

With the consecutive gains in automobile sales during recent months apparently prematurely halted, there has been considerable speculation regarding production possibilities over the remainder of the year. Two large companies seem in agreement that total output in the United States and Canada will not be more than 3,000,000 units, or about 75 per cent of the amount predicted at the beginning of 1930. There still is confidence in the industry's ability to perform in the next six months at a somewhat higher rate than in the same period last year, but the losses in the first half have been too great to be made up before the end of the year.

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Retail automobile sales have declined. Demand this year has been best in New England, New York, Minnesota and California. Southern States and automobile producing section—Michigan, Ohio and Indiana—have made the poorest showing.

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Canadian tariff on automobile parts seems assured, following closely on Canadian Government's recent action in increasing duty on motor cars imported from United States.

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Automobile production in United States and Canada during 1931 now expected to be a maximum of 3,000,000 units, compared with 3,500,000 units last year.

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May pig iron shipments of large Detroit dealer were 25 per cent greater than in April.

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Some Gains and Some Losses in May Motor Car Output

ALTHOUGH it is believed that both Ford and Chevrolet showed production gains in May, as did Graham-Paige, Reo, Nash, DeVaux and several other companies, there was some falling off on the part of others. Buick, for instance, is understood to have assembled about 10,000 cars, compared with 14,000 in April. Chrysler may not have reached April's record on account of a decline in output toward the end of the month. Packard and Hudson are reputed to have

manufactured fewer cars in May than in April. On the other hand, Studebaker, Auburn, Oldsmobile and Oakland-Pontiac are said to have maintained approximately the same production level during the past two months.

Graham-Paige shipments in May were 53 per cent greater than in April. Overseas business increased 66 per cent, Canadian 20 per cent. Production schedules, due to the introduction of the Prosperity Six, were stepped up twice during the month, the factory going on a five-day week instead of a four-day. The Graham body plant increased its working day from 6 to 9 hr. Shipments of the Auburn Automobile Co. up to May 25 this year totaled 22,749 cars, exceeding by 10 its entire shipments during the peak year of 1929 and by 9066 those during all of 1930. The L.G.S. Devices Corpn., division of the Cord Corpn., holding company for the Auburn-Cord group, is doubling the capacity of its Indianapolis plant so that it can produce 2000 spring units daily for its free wheeling unit.

Manufacture of the cones and assembly of the unit will continue at the Columbia Axle Co., Cleveland, also a division of the Cord Corpn. The close attention being given to free wheeling is indicated by the fact that 14 automobile companies now have L.G.S. free wheeling units in experimental cars on their proving grounds. Production at the Grand Rapids plant of the DeVaux-Hall Motors Corpn. has reached 150 cars a day, and all models of the new line now are being built.

Does the Public Demand an Eight-Cylinder Car?

IS the public as eager for an eight-cylinder car as some automobile manufacturers seem to believe? This question was put by an automobile executive who has been studying the situation and who has concluded that a negative answer might well be made.

He points out that, with a single exception, the new Reo Flying Cloud six at $1,295, the public has nothing to choose from in cars selling for more than $1,000, except an eight or a car with a still greater number of cylinders. In cars under $1,000 the eight has not been a conspicuous success. He cites the case of two companies which today are offering both sixes and eights in the lower medium-price bracket. In both instances the six has been in relatively active demand, whereas the eight has lagged. Perhaps this proves nothing, except possibly the fact that the six-cylinder car is not yet ready to be displaced by the eight. It is significant that two companies, Graham-Paige and Reo, are staking sizable investments in new models on the strength of the idea that people still are willing to buy a good six-cylinder car. Reo is the more daring of the two by putting out a six-cylinder model to sell in competition with Buick and Studebaker eights. Reo is pioneering in still another respect: that is, offering a six and an eight identical in design and mechanical equipment, with the exception of the number of cylinders in the motor. Reo's competitors are watching with much interest to see how the public responds to this merchandising plan.

Pig Iron Shipments Gained in April

PIG iron shipments of a large local dealer during May were 25 per cent better than in April. The Chevrolet foundry at Saginaw is reported to have reduced its schedules from six days a week to five, but the daily melt, at 1500 to 1600 tons, is unchanged. Some time ago operations were boosted from five days to six in order to keep abreast of manufacturing schedules, which had been suddenly increased as retail demand for cars mounted sharply. There has been little change in the situation at other foundries, which are operating only at a fair rate at best. It is anticipated, however, that production in June will be curtailed. The Hanna Furnace Corpn. is running both of its local blast furnaces on basic iron at the moment, having recently transferred its second furnace from foundry to basic.

Canada May Increase Duty on Automobile Parts

THE new Canadian tariff, to be announced in a few days, is said to increase substantially the duty on automobile parts. This is in line with the Canadian Government's policy of building up the motor car industry in Canada.

The first step was taken several months ago when the Government reduced, for duty purposes, the discounts allowed importers of American-made cars, which had the effect of increasing almost 20 per cent the customs imposts on these cars. As a result Nash, Reo and Hupmobile have arranged for Canadian plants. Another company with a good business in Canada—Hudson—has not decided on this step. The White company announced the past week that it will establish a Canadian assembly plant for trucks and buses. Gemmer Mfg. Co. is the only parts builder which has made public plans for setting up a plant in Canada. However, if the proposed duty on parts is imposed, American parts companies may be compelled to make their products in Canada if they wish to retain old or obtain new Canadian business. It is whispered in local circles that important American automobile manufacturers with long-established Canadian plants were in large measure responsible for Premier Bennett's action in raising the tariff on cars imported from the United States, feeling that they would gain a sizable advantage as a result.

Sheet Shipments Higher in April; Sales Off

Shipments of steel sheets by independent mills during April, amounting to 211,118 tons, were the largest in several months, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. However, sales declined 44,000 tons, or about 19 per cent, from those of the previous month. Production also declined. However, both sales and production were well above the totals of the first two months of the year. Sales were 191,987 tons in April, compared with 236,310 tons in March, and production was 213,000 tons, against 224,322 tons in March. Unfilled orders declined rather sharply, having been 325,169 tons on May 1, against 383,280 tons on April 1. The April report and comparison in net tons follow:

	April	March	Feb.
Sales	191,987	236,310	168,564
Production	213,608	224,322	192,218
Shipments	211,118	208,207	179,138
Unfilled orders	325,169	383,280	343,439
Unshipped orders	91,431	100,581	89,567
Unsold stocks	85,415	89,334	92,047
Capacity per month	543,400	543,400	496,850
Percentage reporting	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	52.3	64.3	50.2
Production	58.2	61.1	57.2
Shipments	57.5	56.7	53.3
Unfilled orders	88.5	104.3	102.3
Unshipped orders	24.9	27.4	26.7
Unsold stocks	23.2	24.3	27.4

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Freight Rate Decisions

WASHINGTON, June 2.—Rates 35 per cent of the first class were fixed on iron and steel chains and iron and steel barrel or drum material for application in the Southwest in a decision of the Interstate Commerce Commission last week. The decision, supplemental to former findings in the so-called Southwestern cases, covers many products and makes the readjusted rates effective Sept. 3. The carriers had proposed fifth class rates on chains and barrel or drum materials. The commission held they were not justified. The minimum loading for chain was fixed at 36,000 lb. and for barrel or drum material, 40,000 lb.

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Eugene F. Phillips Electrical Works, Ltd., Brockville, Ont., has placed an order for a new copper rod rolling mill to be built jointly by the Farrel-Birmingham Co., Ansonia, Conn., and the Dominion Engineering Works, Ltd., Montreal, Que. The rod mill is to be of the Belgian type, with all of the latest automatic and semi-automatic handling devices. The capacity of the mill will be 15 tons of ¼-in. round rod per hour in 14 passes from standard wire bar. The mill is also being designed to roll a large number of other shapes.

Advocates Building Man Power for Prosperity Needs

Frances Perkins, New York State Industrial Commissioner Tells A.S.M.E. That Far-Seeing Employer Is Preparing Today

HARTFORD, CONN., June 1.—With a session on foreman training and another on the strength of vessels under external pressure, the technical program of a three-day meeting of the American Society of Mechanical Engineers got under way at the Hotel Bond today.

"The far-seeing employer is building today not only his physical properties but his man power," said Frances Perkins, industrial commissioner, Department of Labor, State of New York, in a paper on "Training Apprentices and Foremen."

"At this moment when we are in the slough of depression, none but the far-seeing does such things as these. Experience and insight tell him that the future holds expansion, as the present holds depression; he knows that now is the time to prepare for expansion. Industry is profoundly affected by the present surrounding gloom; for the manufacturer there is no tomorrow; there is nothing in the adage in time of peace prepare for war.

"Some think that now is no time to train men in industry, because unemployment gives us the pick of the market. But the time inevitably comes when the whole scene will change; sales will go up, factories will again hum, and there will be the usual shortage of labor.

"At such a time something must be done; profits can be secured only if production can be obtained, but the employer perhaps feels that labor is not doing its share, either through reluctance or ignorance. The training of workmen is then considered hastily, but it is too late; the 'system' only gets in full swing just as the pendulum begins to swing the wrong way."

Training Foremen for Human Relations

Some of the human problems which affect industrial management and production and some procedures that might solve those problems were outlined in a paper on "Training Foremen to Deal with Human Relations in Industry," by J. A. McCarthy, supervisor of trade and industrial education, New Jersey Department of Public Instruction.

Two courses were suggested, one in which foremen are trained properly to instruct the workers, and another in which the foreman develops an understanding of the causes of human behavior.

In discussing the training of foremen and others of the supervisory group in matters relating to human behavior, Mr. McCarthy pointed out that a general course in psychology will not meet this need. A better course for foremen would be one based upon case studies so presented as to develop an appreciation of the causes of human behavior. In such a course attention should be given to the importance of environment. No attempt should be made to develop ability in the foreman to treat mental or physical conditions which contribute to behavior, this being the job of the physician or psychiatrist.

Such a "human problems in industry" course was said to be established in a large industrial organization. It includes an understanding of the different levels of intelligence and means used in the classification of intelligence, a general understanding of the kinds and uses of tests for determining general intelligence, aptitude and achievement, understanding of the factors which make up environment and many others that influence human behavior.

H. S. Hall, supervisor of trade and industrial education, Board of Education, State of Connecticut, in discussing foreman training in human relationships, also pointed out that such training should deal with everyday problems of the foreman rather than with background material such as general courses in psychology. Discussion of live human relationship problems and cases in meetings of foremen was suggested. At such conferences many opportunities will occur; as group discussion of the case of a "dumb" individual, for example, provides an ideal opportunity to discuss intelligence—what it is, how tests are being developed to measure it, what is meant by the term moron, etc.

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Iron Ore Imports Slightly Less

Imports of iron ore into the United States in April are reported by the Bureau of Foreign and Domestic Commerce at 162,652 gross tons. This is about 4 per cent less than the 169,271 tons arriving in March but is otherwise the largest total since last December. As usual more than half of the movement was from Chile. The total and the Chilean portion thereof were both slightly more than half of the corresponding inflow in April, 1930.

In the first four months of the year, imports have aggregated 576,139 tons, of which Chile furnished about 60 per cent. This is slightly more than half the incoming movement in the like period of last year, when Chile furnished about the same proportion. The imports in four months were the least for that period since 1922. Similarly, the April imports were the least for April since 1924.

Mechanized Coal Mining Made Large Gain in 1930

WASHINGTON, May 29.—Reflecting the quick growth of "mechanized mining," the production of bituminous coal by this process increased 23.7 per cent to 46,824,000 tons in 1930 from 37,862,000 tons in 1929, according to a preliminary study made by F. G. Tryon and L. Mann of the Bureau of Mines. This gain of 8,962,000 tons is pointed to as being the more remarkable because it occurred in a time of acute business depression when the national demand for bituminous coal declined 13 per cent and when production by hand loading fell off 17 per cent.

A better indicator of the growth of mechanization, the report says, is the proportion mined mechanically, which increased from 7.1 per cent in 1929 to 10.5 per cent in 1930. Measured by this standard, the degree of mechanization in 1930 was nearly half again as great as in the preceding year.

Sources of American Imports of Iron Ore

(In Gross Tons)

	April		Four Months Ended April	
	1931	1930	1931	1930
Canada	.....	80	9	150
Cuba	11,560	17,600	23,000	144,600
Chile	86,612	163,380	347,925	701,973
Spain	8,740	6,000	28,337	34,483
Sweden	7,329	41,850	37,223	69,422
French Africa	15,101	21,725	19,602	77,545
Russia	23,347	.....	89,294	.....
Other countries	10,023	62,434	30,749	82,211
Total	162,652	313,069	576,139	1,110,384

Canadian Tariff Increases May Not Have Serious Effect Here

Number of Steel and Machinery Items in Higher Schedules Is Small

WASHINGTON, June 2.—Increased Canadian tariff duties, according to informal views of Government officials, will not have a widespread effect on the United States steel industry. The number of iron and steel and machinery items affected is relatively small, though they represent moderate size tonnages shipped into Canada.

The principal item affected apparently is tank plates. General duties, the only ones dealt with in this dispatch and which apply to the United States, were fixed at $7 a ton on plates up to 60 in., and $5 a ton on plates over 60 in. wide. Previously, plates over 40 in. wide were admitted free of duty, while plates under 40 in. wide were dutiable at $7 a ton.

Total exports of tank plates last year were 91,325 gross tons, of which Canada took 77,032 tons. It is not known what the proportion was of plates over 40 in. wide, but probably it was sizable.

The rate on wire fencing was increased to 35 per cent ad valorem from former dual rates of 15 and 30 per cent. Total exports of wire fencing in 1930 were 3933 tons, of which 523 tons went to Canada. The Canadian iron and steel basket clause rate was increased to 35 per cent from 30 per cent, and covers miscellaneous products shipped to Canada from the United States. The effect of this increase is not known, but it is doubted that it is substantial. The new tariff specifically provided for the continuance of 2-in. oil well casing on the free list.

Present duties of 6 to 17½ per cent on complete parts for repairs of agricultural implements and machinery were extended to March 31 of next year. The machinery basket clause rate was increased to 35 per cent from 30 per cent. Electrical turbo-generator sets, 700 hp. and greater, not made in Canada, were given a duty of 20 per cent. Previously they were free of duty. Magnesite was given a duty of 30 per cent. Formerly this product was free of duty or carried a duty of 25 per cent.

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Large Increase in Pig Iron Imports

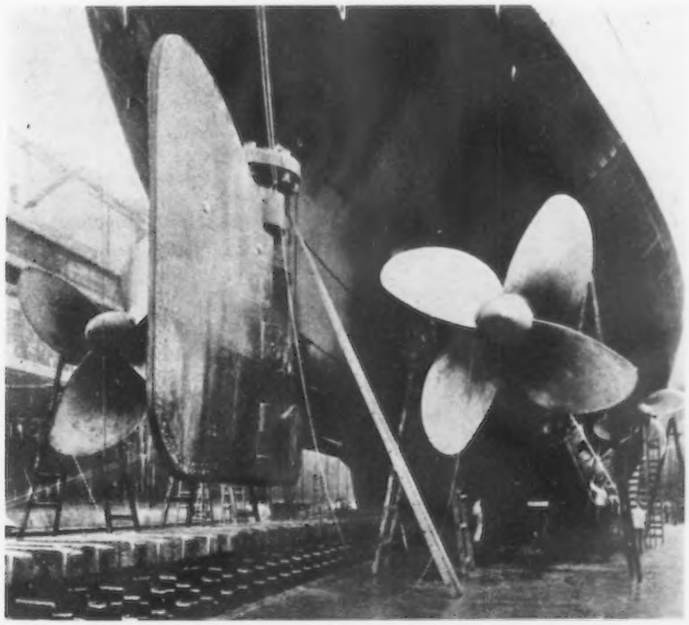
Imports of pig iron into the United States in April are reported by the Bureau of Foreign and Domestic Commerce at 14,479 gross tons. Of this amount almost 80 per cent came from British India. The total is, with the exception of last November, the largest for any month since December, 1929. With that further exception, it is the largest since February, 1929. The April movement was nearly double that of March. Compared with April, 1930, an increase of 19 per cent was registered.

For the first four months the incoming tonnage was 36,433, a reduction of 14 per cent from the same period of last year. In both cases imports from India represented roughly 75 per cent of the total. Netherlands and Sweden were in second and third position this year, whereas the United Kingdom and Netherlands occupied these positions last year.

United States Imports of Pig Iron by Countries of Shipment

(In Gross Tons)

	April		Four Months Ended April	
	1931	1930	1931	1930
United Kingdom	292	159	1,185	4,889
British India	11,499	10,814	26,925	32,822
Germany	.....	50	.....	50
Netherlands	2,688	693	4,708	2,123
Canada	.....	.....	.....	306
France	.....	.....	25	.....
Belgium	.....	.....	.....	.....
Norway	.....	354	86	1,280
Sweden	.....	75	2,978	834
All others	.....	38	526	41
Total	14,479	12,183	36,433	42,345



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LARGE PROPELLER CASTING AND RUDDER FOR NEW SHIP

THE new Canadian Pacific steamer Empress of Britain has what is said to be the largest single bronze casting ever produced and the largest forged steel ship's rudder. The bronze castings are the two inboard screw propellers, each weighing about 25 tons, with a diameter of 19 ft. 3 in. The forged steel rudder weighs 67 tons and is 21 ft. 9 in. high by 20 ft. 3 in. wide. The rudder was produced at Darlington, England, and was hauled overland to the shipyard at Clydebank, Scotland, on a specially built 14-wheel truck and coupled trailer.

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Pig Iron Daily Output Drops 4½ Per Cent in May—Net Loss of 8 Furnaces

DAILY average output of pig iron in May is figured at 64,325 gross tons, a decline of 4.44 per cent from the 67,317 tons in April. This puts the May figure below that for March but above the figures for February, January, December and November last. It is the smallest May daily rate since that of 1921, when 39,394 tons was made.

Coke pig iron production in May was 1,994,082 tons, the figures having been gathered largely by telegraph on June 1 and 2. This contrasts with 2,019,529 tons in April and 2,032,248 tons in March. Except for these two months, the May production was the largest since last October.

In five months a total of 9,466,746 tons of pig iron has been made. This contrasts with 15,327,183 tons in the first five months of 1930. The loss, compared with last year, is about 39 per cent. The current total is the smallest for the first five months since that of 1921, when 8,363,333 tons was made. The 1931 figure, however, was only slightly below that of the first five months of 1922, when production was 9,689,655 tons.

Net Loss of Eight Furnaces

FIVE furnaces were blown in during May and 13 were blown out, leaving a net loss of eight. Thus there were 105 stacks active on June 1, compared with 113 on May 1, and a recent high of 116 on April 1. The loss of eight stacks reduced the gain since the first of the year to 10, as there were 95 furnaces active on Jan. 1.

Furnaces in blast June 1 are esti-

Daily Average Production of Coke Pig Iron in the United States by Months—Gross Tons

	1927	1928	1929	1930	1931
Jan.	100,123	92,573	111,044	91,209	55,299
Feb.	105,024	100,004	114,507	101,390	60,950
March	112,366	103,215	119,822	104,715	65,556
April	114,974	106,183	122,087	106,062	67,317
May	109,385	105,931	125,745	104,283	64,325
June	102,988	102,733	123,908	97,804	.....
½ year	107,351	101,763	119,564	100,891	.....
July	95,199	99,091	122,100	85,146	.....
Aug.	95,073	101,180	121,151	81,417	.....
Sept.	92,498	102,077	116,585	75,890	.....
Oct.	89,810	108,832	115,745	69,831	.....
Nov.	88,279	110,084	106,047	62,237	.....
Dec.	86,960	108,705	91,513	53,732	.....
Year	99,266	103,382	115,851	86,025	.....

Pig Iron Production by Districts, Gross Tons

	May (31 days)	April (30 days)	March (31 days)	Feb. (28 days)
New York and Mass.	105,104	95,375	100,660	91,216
Lehigh Valley	38,745	43,613	47,293	40,232
Schuylkill Valley	27,936	25,665	29,390	24,711
Lower Susq. and Lebanon Valley	18,956	18,652	19,187	16,458
Pittsburgh district	441,653	431,116	427,034	356,341
Shenango Valley	55,835	53,893	46,476	35,361
Western Pennsylvania	32,430	55,632	56,354	45,657
Maryland, Va. and Ky.	77,218	78,442	85,148	78,374
Wheeling district	119,310	110,415	98,348	88,372
Mahoning Valley	172,703	175,963	176,262	134,247
Central and North'n Ohio	185,095	194,453	198,855	172,266
Southern Ohio	23,885	26,460	32,230	7,730
Illinois and Indiana	405,511	445,669	453,241	379,537
Mich., Minn., Mo., Wis., Colo. and Utah	96,256	77,427	86,972	80,452
Alabama	193,445	186,534	172,982	153,900
Tennessee	.....	220	1,816	1,767
Total	1,994,082	2,019,529	2,032,248	1,706,621

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
May, 1930	84,310	19,973	104,283
June	77,883	19,921	97,804
July	66,949	18,197	85,146
August	64,857	16,560	81,417
September	62,342	13,548	75,890
October	57,788	12,043	69,831
November	49,730	12,507	62,237
December	40,952	12,780	53,732
January, 1931	45,883	9,416	55,299
February	49,618	11,332	60,950
March	54,075	11,481	65,556
April	53,878	13,439	67,317
May	51,113	13,212	64,325

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

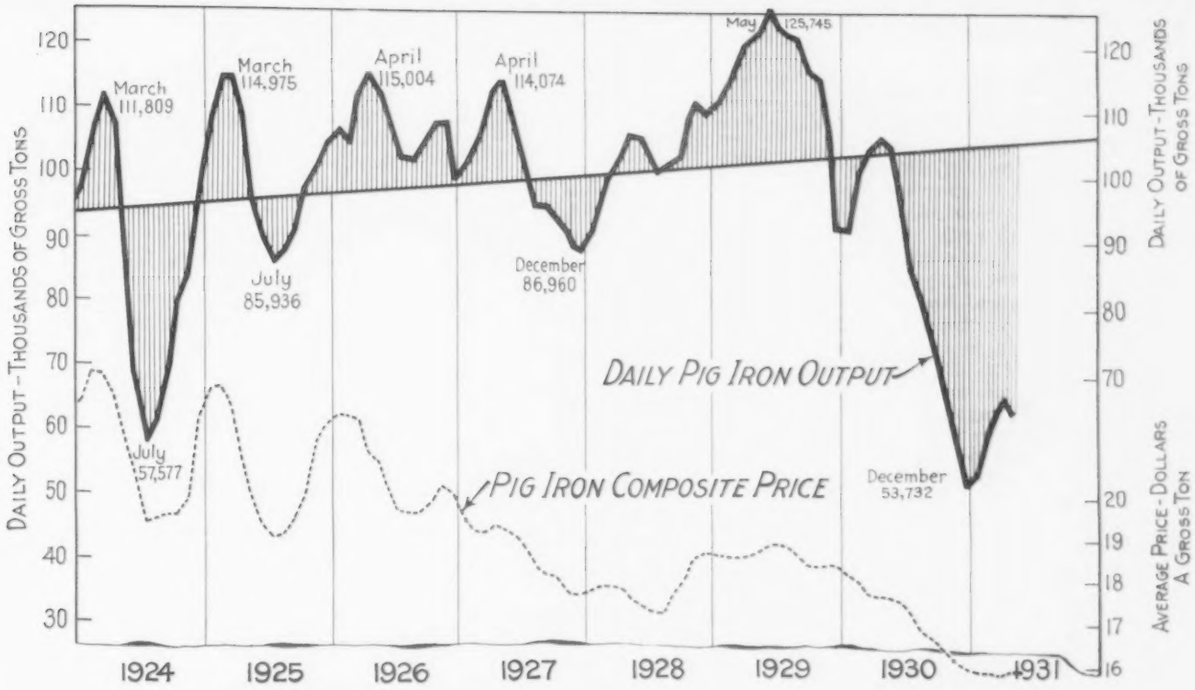
Furnaces	June 1 Number in Blast	June 1 Rate of Operation	May 1 Number in Blast	May 1 Rate of Operation
New York:				
Buffalo	4	2,580	4	2,485
Other N. Y. and Mass.	2	800	2	695
New Jersey	0	....	0	....
Pennsylvania:				
Lehigh Valley	4	1,250*	4	1,455*
Schuylkill Valley	2	900	2	855
Susquehanna Valley	1	610	1	620
Ferromanganese	0	....	0	....
Lebanon Valley	0	....	0	....
Ferromanganese	0	....	0	....
Pittsburgh District	18	12,035	22	14,540
Ferro. and Spiegel.	1	135	1	140
Shenango Valley	3	1,800	3	1,795
Western Pennsylvania	1	635	2	1,410
Ferromanganese	2	410	2	445
Maryland	3	2,015	3	2,060
Wheeling District	5	3,850	5	3,950
Ohio:				
Mahoning Valley	10	6,050	9	5,865
Central and Northern	9	5,280	10	6,040
Southern	2	770	3	880
Illinois and Indiana	17	12,075	20	14,545
Mich., Wis. and Minn.	4	1,970	3	1,645
Colo., Mo. and Utah	3	1,225	2	780
The South:				
Virginia	0	....	0	....
Ferromanganese	0	....	1	105
Kentucky	1	455	1	450
Alabama	13	6,240	12	6,060
Ferro. and spiegel.	0	....	1	160
Tennessee	0	....	0	....
Total	105	61,085	113	66,980

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months Gross Tons

	1929	1930	1931
January	3,444,370	2,827,464	1,714,266
February	3,206,185	2,838,920	1,706,621
March	3,714,473	3,246,171	2,032,248
April	3,662,625	3,181,868	2,019,529
May	3,898,082	3,232,760	1,994,082
5 months	17,925,735	15,327,183	9,466,746
June	3,717,225	2,934,129	.....
½ year	21,640,960	18,261,312	.....
July	3,785,120	2,639,537	.....
August	3,755,680	2,523,921	.....
September	3,497,564	2,276,770	.....
October	3,588,118	2,164,768	.....
November	3,181,411	1,867,107	.....
December	2,836,916	1,665,690	.....
Year*	42,285,769	31,399,105	.....

*These totals do not include charcoal pig iron. The 1930 production of this iron was 96,580 gross tons.



Daily production of pig iron remains further below theoretical needs than in 1924

Inclined line represents the gradually increasing requirements of the country, ascertained by balancing the ups and downs in production. It shows an average yearly increase in consumption of about 575,000 tons.

mated to have been making iron on that date at the daily rate of 61,085 tons. This contrasts with 66,980 tons a day for the 113 active furnaces on May 1.

It is noteworthy that the drop of 27,500 tons in total output from May to June is accounted for wholly by a decline of 40,000 tons in the Chicago district. There was a drop of 23,000 tons in western Pennsylvania, and of 9000 tons in central and northern Ohio. To offset this, there were gains of 10,000 tons each in the Pittsburgh district and the New York and Massachusetts group, of 9000 tons in the Wheeling district, and of 17,000 tons in the miscellaneous group stretching from Michigan to Colorado.

Furnace Changes in May

OF the five furnaces blown in in May, one belongs to the Steel Corpn., two to independent steel companies, and two to merchant companies. Of the thirteen blown out, seven belong to the Steel Corpn., two to independent steel companies and four to merchant companies, one being a furnace making ferromanganese.

Those blown in include a Port Henry, N. Y., furnace of Witherbee, Sherman & Co.; furnace F, Edgar Thomson works, Carnegie Steel Co., Pittsburgh district; a Haselton furnace of the Republic Steel Corpn. at Youngstown, replacing (in advance) a furnace due to go down for relining; a furnace of the Colorado Fuel & Iron Co., Pueblo; a Detroit (Zug) furnace of M. A. Hanna & Co.

Furnaces blown out include the Standish furnace of the Chateaugay Ore & Iron Co., in northern New York; a Clairton furnace of the Carnegie Steel Co., Pittsburgh district; furnaces J and K, Edgar Thomson works; No. 1 Monongahela furnace of the National Tube Co.; a furnace of the Pittsburgh Steel Co. at Monessen, Pa.; a Cambria furnace of the Bethlehem Steel Corpn., at Johnstown, Pa.; a Central furnace of the American Steel & Wire Co., in Ohio; No. 9 and No. 11 furnaces at the Gary works, Illinois Steel Co.; a Federal furnace of the By-Products Coke Corpn., Chicago; the Jisco furnace, Jackson Iron & Steel Co., in southern Ohio; and the Oriskany furnace of the Lavino Furnace Co., making ferromanganese.

As a result of these changes in furnaces in blast, the Steel Corpn. has six furnaces fewer in operation than a month ago, independent steel companies stand in the same position as a month ago, having put two furnaces in and two out, while the merchant stacks, including ferromanganese, show a net loss of two furnaces, with two in and four out.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron Spiegel and Ferromanganese			Ferromanganese*		
	1929	1930	1931	1929	1930	1931
Jan.	2,651,416	2,214,875	1,422,382	28,208	27,260	14,251
Feb.	2,498,901	2,284,234	1,389,304	25,978	21,310	19,480
March	2,959,295	2,600,980	1,676,316	24,978	23,345	27,899
April	2,826,028	2,564,681	1,615,375	22,413	27,777	25,456
May	3,105,404	2,613,628	1,584,511	25,896	30,296	23,959
5 months	14,041,044	12,278,398	7,687,888	127,473	129,988	111,045
June	2,999,798	2,304,223	.....	33,363	27,327	.....
½ year	17,040,842	14,582,621	.....	160,836	157,325	.....
July	3,039,370	2,075,414	.....	31,040	17,728	.....
Aug.	3,065,874	2,010,572	.....	28,461	20,909	.....
Sept.	2,862,799	1,870,269	.....	27,505	21,181	.....
Oct.	2,902,960	1,791,421	.....	31,108	24,480	.....
Nov.	2,498,291	1,491,927	.....	31,866	18,619	.....
Dec.	2,112,704	1,269,529	.....	28,564	16,288	.....
Year	33,522,840	25,101,753	.....	339,380	276,530	.....

*Includes output of merchant furnaces.

Symposium on Metals at High Temperatures

The metallurgical industries are especially interested in alloys for high temperature service, for not only do they supply them to other industries, but they require them in their own processes. Metallurgical engineers will therefore be doubly interested in the joint symposium of the American Society of Mechanical Engineers and the American Society for Testing Materials, to be held in the afternoon and evening of June 23, during the A. S. T. M. annual meeting at the Hotel Stevens, Chicago. The symposium is arranged by the joint high temperature committee of the two societies on effect of temperature on the properties of metals. There will be two sessions, one on the engineering needs for and trends in the industries using alloys at high temperatures, and the other on the properties of the alloys available for such uses.

The symposium will bring together all the up-to-date information on high temperature engineering uses and properties of alloys.

Although there are nearly 30 papers in the symposium, the individual papers will not be read or abstracted in detail at the meeting. Instead, there will be one general summary of the papers on engineering trends and needs at the first session, and one of the papers on metallurgical properties at the second, after which the subject will be thrown open for a general round table discussion.

All the papers will be available from C. L. Warwick, secretary of the A. S. T. M., Philadelphia, so that they may be studied before the meeting. Since the sessions will be all discussion, it is expected that many new facts and valuable points of view will be brought out at the meeting. The complete list of papers follows:

SESSION I. ENGINEERING TRENDS AND REQUIREMENTS FOR METALS AT HIGH AND LOW TEMPERATURES.

"Trends in Engineering Requirements for Metals for Power Plant Industry—Steam Boiler and Superheater Division," by H. J. Kerr.

"Trends in Engineering Requirements for Turbines," by R. C. Allen.

"Metallurgical Requirements for High-Temperature Steam Piping," by F. W. Martin.

"Needs of the Oil Industry," by E. S. Dixon.

"Corrosion and Other Problems in the Use of Metals at High Temperatures in the Chemical Industries," by F. H. Rhodes.

"Engineering Requirements and Trends for Metals in the Metal Industries, Especially in Furnaces for Heat Treating Steel, Galvanizing, etc," by J. C. Woodson.

"Engineering Requirements and Trends for Metals in the Non-Ferrous Roasting, Smelting and Refining Industry, by R. E. Brown.

"Engineering Requirements in the Automotive Industry for Metals Operating at High Temperatures," by A. L. Boegehold and J. B. Johnson.

"Use of Metals at Elevated Temperatures in the Ceramic Industry," by C. E. Williams.

"The trend of Progress in Great Britain on the Engineering Use of Metals at Elevated Temperatures," by R. W. Bailey, J. H. S. Dickenson, N. P. Inglis and J. L. Pearson.

"The Mechanical Properties of Metals at Elevated Temperatures," by Pierre Chevenard.

SESSION II. PROPERTIES OF AVAILABLE METALS FOR HIGH AND LOW TEMPERATURE SERVICE.

"Zinc Alloys for High and Low Temperature Service," by H. A. Anderson.

"The Mechanical Properties of Aluminum and Magnesium Alloys at Elevated Temperatures," by R. L. Templin and D. A. Paul.

"Properties of Bearing Metals at Normal and Elevated Temperatures," by E. R. Darby.

"Properties of Copper and Some of Its Important Industrial Alloys at Elevated Temperatures," by W. B. Price. (With discussion by W. H. Bassett.)

"High Temperature Creep Properties of Wrought Carbon and Low Alloy Steels," by A. P. Spooner and F. B. Foley.

"The Performances of Cast Carbon and Low Alloy Steels in High and Low Temperature Service," by R. A. Bull.

"Effect of Elevated Temperatures on Certain Mechanical Properties of Gray Iron," by J. W. Bolton and H. Bornstein.

"The Wrought Austenitic Alloys," by Edgar C. Bain.

"The Effect of Temperature on Some Properties of Iron-Chromium-Nickel Alloys," by N. B. Pilling and Robert Worthington.

"Nickel and Nickel Alloys Other than the Nickel-Chromium-Iron Group," by C. A. Crawford and Robert Worthington.

"High-Chromium Steels for Extreme Service Conditions," by C. E. MacQuigg.

"Properties of the Rare Metals for High-Temperature Service," by W. H. Swanger.

"Effect of Temperature on the Properties of Nitrided Alloys," by O. E. Harder.

"Effect of Low Temperatures on the Properties of Metals," by H. W. Russell.

"Thermal Expansion of Metals in Relation to High-Temperature Service," by N. L. Mochel.

"Note on Applications of Data on the Thermal Conductivity of Metals," by M. S. Van Dusen.

"Bibliography of Recent Literature on Effect of Temperature on Properties of Metals," by L. F. McCombs.

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Milwaukee Fabricators Offer City Job at Cost

Four of the leading fabricated structural steel companies of Milwaukee have made an offer to the Milwaukee Department of Public Works to furnish at cost all of the steel for the new Thirty-fifth Street viaduct, estimated at 6500 tons, so that they may maintain their payrolls, with the possible addition of men. The department has completed plans and Commissioner David McKeith intends to advertise for bids about June 15.

Dodge, Foote Companies May Be Merged

Plans for a merger of the Dodge Mfg. Corpn., Mishawaka, Ind., and the Foote Brothers Gear & Machine Co., Chicago, are under way. Directors of the two corporations have approved the plan, and stockholders have been asked to approve it by depositing their stock with designated committees. The new corporation, to be known as the Dodge-Foote Corpn., will have capital stock of about $10,000,000.

The stock of the new corporation would be offered in exchange for the common stock of the present companies on the basis of three-tenths of a share of new common for each of the 310,697 shares of Foote Brothers $5 par common and one and one-half shares of new common for each of the 32,090 no-par common shares of the Dodge Mfg. Corpn. The Dodge-Foote Corpn. would offer one new share of Dodge-Foote participating preferred and two shares of its common stock for each share of outstanding preferred and accumulated dividends of the present companies.

The Dodge Mfg. Corpn., which has plants at Mishawaka, Ind., and Oneida, N. Y., manufactures power transmission machinery. Foote Brothers Gear & Machine Co. manufactures gears and speed reduction units at its main plant in Chicago. It is stated that the Foote plant will be transferred to Mishawaka, in the event that the merger is carried out, with a view to effecting manufacturing economies.

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H. G. Batcheller Discusses Special Alloy Steels

The last meeting for the year of the New York section of the American Institute of Mining and Metallurgical Engineers, on May 27, was devoted to iron and steel. The chief speaker was Hiland G. Batcheller, president of the Ludlum Steel Co., Watervliet, N. Y., whose subject was "The Economic Significance of the Special Alloy Steels." After a dinner, attended by nearly 100, Mr. Batcheller was introduced by Dr. F. M. Becket, vice-president, Electro Metallurgical Co., New York, and chairman of the iron and steel division of the institute.

After dealing with the economic depression, some of its causes and cures, the speaker dwelt on the latest developments in nitriding steels, carbide cutting tools, the rustless steels and steel houses.

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Cutler-Hammer, Inc., Milwaukee, has removed its Atlanta office, in charge of A. C. Gibson, to 133 Cone Street, N. W. The new quarters include warehouse facilities.

... PERSONALS ...

F. H. N. GERWIG, assistant superintendent of blast furnaces at Edgar Thomson works, Carnegie Steel Co., Pittsburgh, has been appointed superintendent of blast furnaces at that plant, succeeding the late A. C. Maccoun. Mr. Gerwig was born in Pittsburgh, attended the public schools of Wilkinsburg, Pa., and was graduated from the University of Pittsburgh in 1895 with an M. E. degree. He entered the steel industry as a draftsman with JULIAN KENNEDY, Pittsburgh consulting engineer, in July, 1895, and in January, 1898, went to the Duquesne works of Carnegie Steel Co., where he remained until Nov. 30, 1900. He then went with S. V. Huber & Co., Pittsburgh, as assistant chief engineer, but returned to the Carnegie company as steam engineer at Duquesne works in May, 1901. Two years later he was made assistant master mechanic of Duquesne works, and in June, 1905, became assistant superintendent of Carrie furnaces. He went with the Pittsburgh Steel Co., Monessen, Pa., as superintendent of blast furnaces in January, 1912, but returned to the Carnegie company as assistant superintendent of blast furnaces at Edgar Thomson works in the following year, remaining in that capacity until his recent appointment.

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J. S. TRITLE has been elected vice-president and general manager in charge of manufacturing, sales and engineering operations of the Westinghouse Electric & Mfg. Co., East Pittsburgh. He was born at Virginia City, Nev., in 1872, and attended school in New Haven, Conn., later entering Yale University, from which he was graduated in 1893 with a degree in science. In 1895 he engaged in the electrical engineering contracting business, in which he continued for eight years. At the World's Fair in St. Louis he served as chief of construction, and at the close of the fair became manager of the Kansas City district of the Westinghouse company. In 1915 the St. Louis and Kansas City offices were consolidated, Mr. Tritle assuming charge of both. In 1922 he was made manager of the merchandising division of the general sales department of the company. In 1925, when a separate department was made of the merchandising business, Mr. Tritle was appointed general manager of the merchandising department overseeing engineering and manufacturing, as well as sales work, with headquarters at Mansfield, Ohio, where most of the merchandising products are made. From Mansfield he was moved to East Pittsburgh on May 1, 1929, as vice-president in charge of manufacturing operations. In his new position as vice-president and general manager, Mr. Tritle will retain his headquarters in the Westinghouse company's main works at East Pittsburgh.

F. H. N. GERWIG

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GEORGE B. KARELITZ has been appointed acting manager of the mechanics division of the Westinghouse Research Laboratories, East Pittsburgh, succeeding JOHN M. LESSELLS, who has been transferred to the company's South Philadelphia works. Mr. Karelitz joined the Westinghouse company in 1923, and served as a research engineer until September, 1930, when he joined the engineering faculty at Columbia University, New York. He was born in Russia and is a graduate of the Petrograd Polytechnic Institute.

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ARCHIBALD HAZLEHURST has been appointed manager of sales of the Sterling Steel Foundry Co., Braddock, Pa. He formerly was associated with American Steel Foundries in Chicago and Pittsburgh.

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NORMAN HUSTON, New York district sales manager for the Alan Wood Steel Co., Conshohocken, Pa., has resigned, effective June 30.

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JOHN CALDER, American engineer and specialist in industrial relations, has been appointed adviser to Soyustroy, the division of the Soviet government which handles new construction work, according to a dispatch from Moscow to the New York *Times*. Mr. Calder has been assigned by the Supreme Industrial Council of Russia to the supervision of the reconstruction of 90 plants in steel and affiliated industries. His immediate assignment is at the Magnitogorsk steel plant.

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T. J. MUIR has been appointed director of sales and A. T. DAVIS, sales manager, of the Morgan Engineering Co., Alliance, Ohio. Mr. Muir has been connected with the company for 29 years, 24 years of which were in the sales department. For three years he has been assistant sales manager. Mr. Davis has been in the employ of the company 19 years and for 12 years has been connected with the sales department.

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THOMAS TEMPLE, for the past 15 years superintendent of the American Steel & Wire Co.'s properties at Birmingham, on July 1 will become active superintendent of the two company plants at Joliet, Ill. Previous to going to Birmingham, Mr. Temple was superintendent of the DeKalb plants of the American Steel & Wire Co. J. W. BERSCHEID, for the past three years superintendent of the Scott Street and Rockdale plants of the American Steel & Wire Co., at Joliet, Ill., has been transferred to Fairfield, Ala., as superintendent of the plant. Mr. Berscheid had been associated with the Joliet foundry since he was 14 years of age. He was made superintendent of the Scott Street plant in 1925 and three years later became head also of the Rockdale plant. Two hundred employees attended a farewell dinner given him on the eve of his departure for the South.

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CHARLES R. MCCONNER, who has been branch manager in Detroit for the Carrier-York Corpn., has been made sales manager of the Clarage Fan Co., Kalamazoo, Mich. Prior to his connection with the Carrier company, he had been with the Clarage Fan Co. since 1920.

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E. J. FULLAM has been elected president of the Bryant Chucking Grinder Co., Springfield, Vt., succeeding the late W. L. Bryant. W. J. BRYANT, advertising manager, has been made vice-president, and J. E. STETSON, general manager. J. B. JOHNSON has become assistant general manager, and A. L. HICKS, assistant treasurer.

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O. E. VAN ALTENA, who has been identified with the automotive industry for the past 17 years, has been appointed Middle Western district

sales manager, with headquarters at 1925 South Wabash Avenue, Chicago, of Aluminum Industries, Inc., Cincinnati.

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FREDERICK M. FEIKER, secretary of the Associated Business Papers, Inc., New York, has been appointed by PRESIDENT HOOVER as director of the Bureau of Foreign and Domestic Commerce, succeeding WILLIAM L. COOPER,

F. M. FEIKER

who will resume his former post as commercial attaché at London. Mr. Feiker formerly served as assistant to Mr. Hoover when the latter was Secretary of Commerce, and prior to that was a vice-president of the McGraw-Hill Publishing Co. He not only has been prominent in the business paper field, but also is well known for his activities in connection with trade association work. He has been chosen to head the important bureau of which he has been made director in recognition of his knowledge of economic and industrial problems of both domestic and foreign character. Mr. Feiker enters upon his new duties on July 1.

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HAROLD P. MUELLER has been elected president of the L. J. Mueller Furnace Co., Milwaukee, and its subsidiary, Manufacturers Foundry Co., to fill the vacancy caused by the death of his father, Louis J. Mueller, Jr., for many years president and treasurer. Heretofore Mr. Mueller has been vice-president and sales manager. PAUL E. MUELLER has been elected to the newly-created office of chairman of the board. GUSTAV C. MUELLER returns to active association with the company as vice-president. JOSEPH SCHLUETER has been appointed secretary and treasurer.

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HARRISON HOBLITZELLE, who has been vice-president and general manager of the Commonwealth division, at Granite City, Ill., of the General Steel Castings Corpn., has been elected executive vice-president of the Steel Castings company, in charge of all operations there and at the corporation's other division at Eddystone, Pa. His headquarters has been moved to Eddystone. Mr. Hoblitzelle joined the Commonwealth Steel Co. in November, 1917, as a member of the staff of the purchasing department. Later he was made vice-president in charge of sales. When Commonwealth was merged with the General Steel Castings Corpn. in 1929, he was made vice-president and general manager of the former division. JOHN H. LOCK has been promoted from assistant general manager to general manager of the Commonwealth division. He became identified with the Commonwealth Steel Co. in 1912.

E. B. CLEBORNE, of the Wallingford Steel Co., Wallingford, Conn., has been made president of the Sales Managers' Association of Connecticut.

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HARRY L. BRINDLE, assistant general superintendent of the Farrell, Pa., works, Carnegie Steel Co., has been made general superintendent of that plant, succeeding A. L. CROMLISH, who was recently transferred to the Duquesne works. Mr. Brindle was born at Sharon, Pa., and was first employed as apprentice roll turner with the Carnegie company in June, 1907. He later took up metallurgy in special courses, and subsequently the machinist trade. At Farrell he has been successively assistant machine shop foreman, assistant master mechanic, master mechanic and assistant general superintendent.

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▲▲▲ OBITUARY ▲▲▲

CHRISTOPHER T. CLACK, president, Blaw-Knox International Corpn., New York, a subsidiary of Blaw-Knox Co., Pittsburgh, died suddenly at Düsseldorf, Germany, May 17, after a few days' illness. He was prominently identified with the iron and steel industry for many years, having been at different times connected with the American Bridge Co. and other leading organizations. Later, he became one of the receivers for Milliken Brothers, Inc., New York, operating a structural steel fabricating plant at Milliken, S. I. In concluding the financial affairs of the Milliken business, Mr. Clack purchased certain assets and good will, reorganizing as Milliken Brothers Mfg. Co., of which he became president. He gave his entire time to the Milliken organization, particularly in connection with the development of its structural steel specialties in foreign countries. When Milliken Brothers Mfg. Co. was acquired by the Blaw-Knox Co., in the latter part of 1927, Mr. Clack became president of Milliken Brothers-Blaw-Knox Corpn., which was organized as the export division of the purchasing company, and now known as Blaw-Knox International Corpn. Mr. Clack had resided in England for several years past, handling the affairs of his company in that country and in Europe, and was in Germany on business at the time of his death.

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ALBERT N. ABBE, vice-president and general purchasing agent of the American Hardware Corpn., New Britain, Conn., died of a cerebral hemorrhage at the New Britain General Hospital on May 29, aged 71 years. His early business training included bookkeeping for a plumbing house in New Britain, and in 1887 he was made purchasing agent of the P. & F. Corbin Co. When the Corbin company was merged into the American Hardware Corpn. in 1903, Mr. Abbe was appointed general purchasing agent.

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GEORGE BUCHANAN, president, Long Island Foundry Co., Long Island City, N. Y., died of pneumonia on May 22.

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PHILIP S. RINALDO, president and one of the founders of the Flexible Steel Lacing Co., Chicago, died May 30 at his home at Wheaton, Ill., after a long illness.

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EDGAR F. VILES, for years president of the Waltham Screw Co., Waltham, Mass., died at his home in Concord, Mass., on May 20. He was born in Waltham, May 23, 1876, and was graduated from Brown University in 1896.

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F. G. WALLACE, formerly president and general manager of the Kingston Locomotive Co., Kingston, Ont., died at his home in Edgewood, Pa., on May 10, aged 78 years.

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Rapid development of the natural gas industry during the past four years has placed the industry among the leaders in the public utility field, according to a brochure prepared by Ford, Bacon & Davis, Inc., engineering firm, 39 Broadway, New York. The longest line, it is stated, is the Southern Natural Gas Co.'s system, extending from the Monroe-Richland field in Louisiana to Atlanta, Ga. This system includes 429 miles of main trunk line, 67 miles of feeder line and 829 miles of branch lines.

Better Adjustment of Output to Demand

BY DR. LEWIS H. HANEY
DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

STEEL production in April decreased, while activity in the chief steel-consuming industries increased. Thus there was progress toward restoring the lost balance between current production and current consumption. This is welcome from every point of view.

Unfortunately, the past year has shown an unusually persistent excess of steel production over indicated requirements. Even allowing for some shifting in relative importance of consuming industries or the development of new consumers, a considerable excess supply of steel is indicated. This surplus may be in the hands of producers, middlemen or consumers.

Wherever the stocks, statistical measurements indicate their existence. And if these indications are correct it will take several months to restore that balance between production and the requirements for current consumption which is to be expected before the steel markets can become stabilized.

In April our measurements of automobile production, railroad freight traffic, general manufacturing activity and machine tool orders increased more than seasonally. In the same month mining and oil activity and exports of iron and steel decreased more than normally. Building and construction activity showed little change, after adjustment. Net result: our "composite demand line" is somewhat over 79 per cent of the 1921-1927 average, and is the highest since last October.

As to the outlook for May and early summer: It seems reasonably clear that steel production will show a more-than-seasonal decline. This conclusion is based partly on the preceding reasoning about stocks of steel, partly on steel production and price movements in recent weeks, and partly on the outlook for activity in the chief consuming industries.

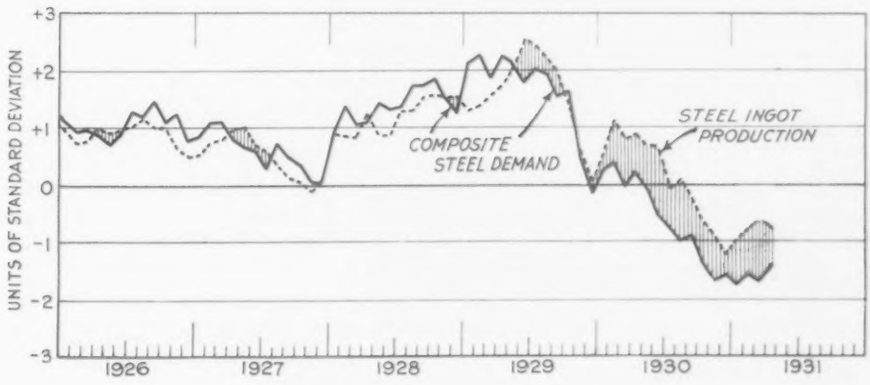
As we had anticipated, sales of automobiles do not appear to be so well sustained as manufacturers had anticipated. Perhaps a few companies have realized their expectations, but there is evidently not room for all of them. It is clear that there was a good deal of anticipation of their requirements by automobile manufacturers. As a result, recent buying of steel has hardly been in proportion to the April increase in production. It may well be doubted if May automobile production is as large as preliminary estimates and indications are that the usual seasonal decline has already begun.

No hope for increased steel buying is found in the railroad situation. Car loadings have reacted sharply, considering the season, and no indication of improvement in earnings has yet appeared. Obsolescence will probably be ignored as long as there is so considerable a surplus of old equipment and the financial position of the carriers is so strained.

In construction we still find the process of deflating over-valued real estate under way, and speculative builders awaiting the return of confidence in the bond market. Building activity may be at bottom levels, but is likely to remain subnormal for some months yet.

General manufacturing, though well sustained through April, is undergoing a secondary reaction in most lines. Perhaps the dullness in the market for manufacturers' wire and the decline in the volume of shipments in May is as good an indication as any. Certainly factory equipment buying will be at a minimum during the next month or two. Nor in mining nor in the export field do we see any signs of a pickup in demand for steel.

While, therefore, we may hope that steel requirements may be maintained not far below present levels, it seems highly probable that steel production will have to be reduced somewhat further.



CLOSING of the spread between steel production and demand is encouraging. But recovery cannot be definitely predicted until demand rises above output.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

What New Things?

IT is no new thought that one of the big influences that will eventually get us entirely out of this depression will be the development of new commodities and forms of service, but the thought has been growing. It would be more widespread if the business man were really highly imaginative. He is very good at picturing the future of a proposition, but he must first have the proposition, and he requires it to be very distinct in form—tangible, so to speak.

For decades past new things have been coming out. Many have been amazed at the vogue they have acquired. Yet other things have been predicted that have not come about. Numerous manufacturing concerns can tell of failures of this sort.

Dependence is now commonly on "research" to furnish the developments to expand business. Research is a good thing, but so far its record in this respect has not been distinctly favorable. It may be said to have entered a new era some fifteen years ago, by reason of the war stimulus. In the intervening period it has had more influence upon employment by lessening the time and effort required to produce old things than by developing new things creating employment.

This statement must be taken broadly or it may be doubted. A new thing is brought out and it makes much fresh employment as demand grows, but later on economies in doing the thing are introduced at a rate faster than that by which the demand grows. Right during this depression that process is going on, in some cases under increased pressure to do or make the thing at a lower price, thus to invite more patronage.

Prediction being hazardous, since history shows that some predicted things have not occurred while others subject to little prediction have occurred, it is only a venture to suggest that dwelling house construction along entirely new lines will prove to be the chief addition to our physical activities to restore us to full activity.

When one comes to think of it, the field is the biggest possible and the opportunity the most inviting. Everybody has to have shelter and the house at best is going to cost a great deal of money per capita relative to the cost of other things people need. On the other hand, nothing could be funnier than the way we have been building houses compared with the way we do other things that are done on a larger scale, like building automobiles or running freight trains or publishing newspapers.

The system of high wages in the building trades as we now see it exists because there was no big force opposed to make a contest. There is virtually a new employer each time. The manufacture of houses on a very large scale is now envisioned by various groups of people, who are pushing their respective ideas. One of these schemes may succeed, or perhaps one that has not yet come out into the open. Perhaps there will be more than one, which would be all the better, as the competition would widen the market.

Price Stabilization Badly Needed

LAST week James A. Farrell, president of the United States Steel Corpn., again struck out at unprofitable merchandising. At the annual meeting of the National Foreign Trade Council, of which he is chairman, he reiterated, in language changed only for the occasion, the strong indictment of present business policies with respect to prices that he made at the meeting the week before of the American Iron and Steel Institute.

In phraseology adapted from Mr. Farrell's address as chairman of the Foreign Trade Council, that body adopted a declaration which embodied the statement that "an essential necessity of the present economic situation is an advance in commodity prices."

Striking again while the iron was hot from his remarks of only a few days before, Mr. Farrell strongly emphasized his belief that the American people have within themselves the power to lead in world trade recovery. Just as the other nations are looking to the United States to pave the way back to prosperity, so there are many elements in the business situation of this country that look to the steel industry for leadership in a stabilization movement.

There can be no doubt of the fact that nearly all buyers of steel, and these embrace most of the essential industries of the country, recognize the futility of striving for greater volume of business through continuing concessions in prices, especially when such prices are mostly below the costs necessary to assure a fair wage to labor and a return to management and stockholders commensurate with the turnover, small though it is. There should be general agreement with the declaration of the Foreign Trade Council that "competition is unfair both to industry and to the community when price cutting compels the sale of goods at a loss."

Not only is a weak price situation destroying profits for many companies, but in the steel trade there is evidence on every hand that a great deal of pending work is being indefinitely postponed because of lack of price stabilization. It would seem, therefore, that the common sense of the executives of the steel industry

might be depended upon to resist further sporadic price shading and thus establish a level clearly to be accepted as the minimum. Subsequent higher prices will take care of themselves when something approaching a united front to sniping is achieved. A receivership for one of the smaller steel companies is an unpleasant reminder of the consequences that are likely to follow a continuation of the present ruinous price bartering.

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The Price for Copper

IT has always been the contention of the ultra- for Lake copper to 9c., which was the lowest price of record, and about 7500 tons was sold. This was a delivered price, which appears to have been equivalent to about 8⅞c., New York, at that time. The market then rallied to 9¼c., but in August the Calumet & Hecla sold 10,000 tons at 9c.

In 1894 Lake copper normally commanded a premium of ⅛c. a lb. over electrolytic, but in making its 9c. sales the leading Lake producer sacrificed all premium and that price may be considered as the electrolytic price. Indeed, the strong demand that followed the dumping in August enabled electrolytic producers to realize full Lake prices and even better. In December, 1894, copper was firm at 10c. and before many months the price was over 12c.

Late in May, 1931, the price for electrolytic copper became 8½c. delivered in the domestic market, which is reckoned as equivalent to 8.25c. f.o.b. New York refineries. This became a new "lowest of record," but so far there has been no such magnitude of sales as in 1894, and certainly no dumping.

At 8½c. for copper there is no margin for any but exceptional producers even on the basis of immediate costs. On the basis of economic cost, which includes capital charges, the existence of any margin is even more exceptional. This means that any industry requiring a great deal of copper—the electrical, for example—would far better buy it at 8½c., or even much higher, than to try to find and develop and equip a mine to provide its own supply. Good copper mines are hard to find and great copper producing districts are developed only occasionally, e. g., the American porphyries about 1905, the Chileans about 1912, Katanga later, and most recently the Rhodesians, which last are barely beginning to produce.

These remarks are more picturesque than practical, inasmuch as it is certain that no considerable quantity of copper could be contracted at 8½c. A British commission has recently recommended the complete electrification of the railways of Great Britain, which indicates a requirement for a million to a million and a half tons of copper. If the decision were made forthwith, academically the rationale would be to buy all of the necessary copper right now at 8½c. (meaning, of course, the equivalent in Great Britain), but commercially no such thing could be done, and it is foreordained that if, when and as the British railway system is electrified its copper constituent will have cost the economic price for the period.

Anyway, the vision of future electrification abroad and at home, the expanding use of telephones, the piping of the houses that will be needed by increasing population and a myriad of other requirements should counteract the profound pessimism of the day, not only in respect to copper but also to iron and steel and the other commodities that are necessary in our economic life.

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Mallock and Green

IT has always been the contention of the ultra-capitalistic economists, Mallock preeminently, that labor has never done anything for itself; that the improvement in the scale of living that the masses have enjoyed is the result of what has been done for them by inventors, engineers and management, the benefit of which has in the main accrued to labor. This associates itself with the theory of the residual claimancy of labor, so thoroughly expounded by Francis A. Walker, and is, of course, the antithesis of the ideas of Karl Marx and of the modern beliefs that labor does not enjoy the full fruit of its toil.

William Green, head of the American Federation of Labor, in his last pronunciamento naively alines himself with Mallock. Recognizing that no producer can continue to produce indefinitely at a loss, he said that management must not try to change red ink to black by reducing wages, but rather must make such further improvements that existing wages, high though they be, shall be maintained. This is just what management is essaying feverishly to do. We are glad to appreciate, moreover, that in its inspired attempts it now receives the hearty cooperation of labor instead of the resistance that was commonly encountered when the going was easy.

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The Inverted Spiral

IF one class of labor accepts reductions by natural constraint and another class refuses to entertain anything of that nature, there results an even more destructive unbalance than that which contributed to the depression.

At the present time commodities, especially those that are used in building, are phenomenally cheap. Anyone who contemplates the requirement of a large quantity of copper for electrification or other purposes would better buy it at present prices than to try to find a mine to produce it for his own account. Likewise as to zinc and lead and many other things. But while such commodities are cheap the labor that is required to use them (as distinguished from that required to produce them) is not cheap, and consequently constructions are not cheap and constructions are not undertaken. It is this condition that produces the paradox of poverty amid plenty, and unemployment in the face of widespread needs.

Wage reductions have occurred mainly among miners and factory workers. The adjustments have ranged from 10 to 20 per cent, with the higher figure tending to become the more general. They have contributed to the maintenance of production, which in

turn has contributed to the pressure upon the markets, for the reason that the outlets for production have been throttled by the obstinacy of the labor that is engaged in the distribution and use of materials.

There has not been complete strangulation, because even in those occupations there has been much wage readjustment by bootlegging and carpetbagging. Readjustment of the latter kind, however, is a crutch rather than a cure, for with contractors and unions signing up for a continuance of existing wage scales for another three years, every one knows that industrial convalescence in spite of ourselves would bring us back to the evil conditions of early 1929.

We await therefore a readjustment in those branches of labor, not to pre-war levels, but perhaps to the level of 1923-25, which would still be twice the rates of 1913. There must also be a readjustment in many other services, such as medical, and in rentals. The latter will be an inevitable consequence of more building.

Such general deflation does not imply reduction in the scale of living. The scale of living is not determined by wage rates, but rather by work done. Figuratively the normal condition of a progressive economy is that of an ascending spiral. In the present depression we have the condition of an inverted spiral. We have ignorantly and willfully done the inverting. This is expressed in the unbalances that we have created.

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Momentum of Structural Steel

THE course of affairs in fabricated structural steel since the stock market collapse has been very interesting. It emphasizes the fact that the depression we are now in was not expected. It is important to recognize that fact fully when an effort is made to interpret what is now occurring. One must particularly avoid taking too much stock in statistical comparisons of this depression with others, for the circumstances as to expectedness are different.

Weekly reports of the Department of Commerce, showing shipments for the reporting companies, have now been continued long enough to relate them to the monthly statistics, pro-rated for the whole industry, whereby a series of index numbers can be computed. Shipments held quite uniform, at a high rate, during the first ten months of 1930, then dropped sharply for November and December. Weekly reports are available for the first 18 weeks of this year and it is observed that the first nine weeks held together quite well, and the second nine weeks held together, at a lower rate. The index numbers given below are for periods distinct from each other, the time division being such as to bring out the swings.

Rate of Shipping Fabricated Structural Steel	
Year 1928	100.0
Year 1929	105.9
Ten months, 1930	100.8
November-December, 1930	69.9
First 9 weeks, 1931	62.6
Second 9 weeks, 1931	56.1

The base year taken, 1928, was record in its time. While the 56.1 index number for the recent nine-week period may seem low, the real point is the highness of shipments for 12 months after the stock market collapse. A similar index constructed for steel ingot production shows 68 for the same period, and in a depression structural steel would naturally decrease more than total steel.

In other words, fabricated structural steel had much momentum. The shops were very well booked at the time of the stock market collapse and there were heavy lettings for months afterward. The relative lightness of structural business lately does not represent something fresh gone wrong, it represents a loss of momentum. There was momentum because the depth and extent of the depression that was coming were not foreseen.

The difference between this and other depressions in that respect is a striking and important one. The depression of the eighteen-nineties is commonly dated from the panic of June, 1893, but there had been loud warnings in actual developments. There had been the Baring failure of 1890, and in 1892 the people elected Mr. Cleveland because "they wanted a change," feeling that things were not right.

In 1928 they elected Mr. Hoover because they were satisfied, not dissatisfied. The depression of the eighteen-seventies dates from the panic of Sept. 19, 1873, but there had been reactions in 1867 and 1869, and in late 1871 bank reserves barely exceeded requirements while interest rates were high. The country was on a currency basis and there could not have been much confidence with gold at a premium and people doing business with promissory notes.

This depression is quite different and the unusual length of time it has taken to reach its depth is a reflection of the unusual momentum with which it was entered rather than an index to its total severity.

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Materials Handling in Quantity Production Shops

(*Concluded from page* 1809)

switches at various points so that the load-carrying trolleys can be switched off and held stationary or side-tracked, as desired.

The last type of conveyor is what, for lack of a better name, may be called the special-purpose design. That is a conveyor which has been designed to meet some particular and individual problem. Within such classification would fall single and double-strand assembly conveyors, handling special fixtures; double-strand conveyors for enameling ovens, including automatic dipping; heat-treating furnace equipment; and the like.

It should always be borne in mind that no one type of apparatus will solve all problems, and that usually each problem has its own best solution, which solution can be arrived at only after a careful study of all possible means of attack.

MARKETS

Seasonal Influences and Wall Street Gloom Affect Steel Demand

INGOT Output Down to 42 Per Cent—Pig Iron Production Off 4½ Per Cent in May —Construction Most Promising Steel Outlet—Scrap Lower at Pittsburgh

SEASONAL influences and a fresh wave of pessimism, engendered by the performance of the securities markets, are having their effect on iron and steel demand. The fact that production is still declining is not surprising; the impressive feature of the current situation in the steel industry is that the recession in output is so gradual.

Apparently there is little remaining margin between current consumption and rock bottom requirements, and meanwhile exaggerated caution is resulting in the piling up of deferred needs which, when released, should tend to make the eventual upturn in demand more pronounced. While the attitude of buyers is now mainly a reflection of Wall Street gloom, it may later respond to what appears to be definite change in the policy of sellers. Having become reconciled to a low rate of operations, producers have abandoned hope of the economies that come from volume and are more determined in their efforts to obtain prices in keeping with costs.

FINISHED steel prices, as measured by THE IRON AGE composite price, now average 2.102c. a lb., or only $2.08 a ton above the low point reached in the last severe depression (1.998c. a lb. on Feb. 28, 1922). And, if one takes into account the amount of business booked in recent months that is represented by large construction projects, usually subject to rather sharp concessions, it is likely that net average returns per ton are no higher than they were nine years ago.

PIG iron production in May showed a decline of 4½ per cent. While this was the first reduction in output since December, it was foreshadowed by the downturn of steel ingot production in April and the continued recession of steel works operations during the past month. Current ingot output is estimated at 42 per cent, as compared with 44 per cent a week ago. Pittsburgh, Chicago, Cleveland and Buffalo operations have given further ground, while there has been a moderate recovery in the Valleys. In some instances lower production is accounted for by tardy resumptions following holiday suspensions.

A prime cause of the present decline in steel production is the slackening of activity in the motor car industry. Automotive demand for steel this month is expected to show further curtailment, since retail sales of cars have been adversely affected by the recent stock market slump. The Chevrolet company, which is credited with a production of close to 115,000 cars and trucks in May, is reported to have cut its schedule to 82,000 units for June.

RAIL mill operations continue to taper, now averaging 35 per cent at Chicago, and tin plate output has receded from 70 to 65 per cent of capacity. Plants making line pipe, structural steel and reinforcing bars are making the best showings.

Structural steel awards, including 37,000 tons of welded plate work for the Hetch Hetchy pipe line in California, total 81,500 tons, placing the past week among the best of the year. The Hetch Hetchy pipe will be fabricated by the Western Pipe & Steel Co., while the steel will be supplied by the Tennessee Coal, Iron & Railroad Co.

Oil and gas line demand is featured by the placing of 8000 tons by the Magnolia Pipe Line Co. with the A. O. Smith Corpn. and the award by the Humble Pipe Line Co. of 6500 tons, of which 2000 tons went to the National Tube Co. The Milwaukee fabricator has divided orders for about 36,000 tons of skelp between Chicago mills.

SCRAP prices at Pittsburgh have undergone a general decline of 25c. to 50c. a ton, the leading grade, heavy melting steel, having receded 25c. a ton. In most other markets prices are largely unchanged, although at St. Louis several advances are reported and at Chicago cast iron car wheels have gone up 50c. a ton following a rise of 75c. a ton in the previous week.

PIG iron production in May was 1,994,082 tons, or 64,325 tons a day, compared with 2,019,529 tons, or 67,317 tons daily, in April. Thirteen furnaces were blown out and five were lighted, a net loss of eight, leaving a total of 105 active stacks, compared with 95 on Jan. 1.

THE IRON AGE composite price for finished steel has declined from 2.114c. to 2.102c. a lb., following a change in the discount structure for steel pipe. Steel scrap has receded from $9.75 to $9.67 a ton, the seventh decline in eight weeks. Pig iron is unchanged at $15.63 a ton.

PITTSBURGH

Curtailment in Steel and Pig Iron Production Continues—Scrap Lower

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PITTSBURGH, June 2. — The rather sharp seasonal curtailment in steel production, which was in evidence during the last weeks of May, is continuing into the new month, although adjustment of output to the usual dull demand of the summer months seems to be approaching completion. Thus far contraction has not been more pronounced than might be expected at this time of the year, but the present low level of activity accentuates the usual seasonal fluctuations.

Steel ingot production in the Pittsburgh district is estimated this week at slightly over 40 per cent of theoretical capacity, while activity in the Wheeling and Youngstown districts is virtually unchanged.

Ingot output has set the pace for blast furnace activity, with five steelmaking stacks having gone out in the Pittsburgh area during the last two weeks. A merchant furnace is also scheduled to be banked or blown out early next week.

Finishing mill activity has not changed much, although moderate contraction is reported in tin plate, sheets and strip steel. Production of bars and shapes is better maintained, and pipe orders have resulted in increased production on both electric welded and seamless material. Line pipe awards during the week include one of 8000 tons and another of 6500 tons, the larger of which has been placed with the Milwaukee fabricator. No important structural bookings are reported in this district, although a West Virginia coal company has ordered 10 barges, requiring 1600 tons of plates and shapes. Shipments of structural steel and reinforcing bars are fairly well maintained, but releases on bars, sheets and strip from the automobile industry are somewhat lower.

The general run of small consumers of finished steel products are buying only in very small lots, and urgency for delivery is forcing mills to maintain a somewhat higher rate of operations than would seem to be justified by aggregate production.

Third quarter price policies have not been definitely determined, but there is no indication of a contemplated change except in the case of sheets, on which new selling and differential schedules are being introduced. Mills are anxious to stabilize quotations before attempting to introduce the new plan, and are somewhat successful on some lines. Makers of hot-rolled strip are generally quoting 1.55c. and 1.65c., Pittsburgh, an advance of $1 a ton from recent minimum quotations. Standard pipe has been advanced slightly following a few weeks of lower quotations on direct shipments, and line pipe producers are taking a firmer price stand.

Curtailment of steel and pig iron production apparently not yet checked.

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Ingot operating rate for Pittsburgh district slightly above 40 per cent of capacity.

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Five steel company blast furnaces blown out in two weeks. Merchant furnace scheduled to go out.

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Scrap continues to weaken. Heavy melting steel at average price of $10.75.

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Third quarter price policies not definitely formulated, though sheet and strip quotations probably will be higher.

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Nothing of importance has developed in the market on raw materials, although a large buyer of basic iron is reported to be in the market for a substantial tonnage. Scrap prices continue to decline, and consumers are showing little interest in contracting.

PIG IRON

Interest in this market is still centered in the basic grade, as another large consumer is reported to be in the market for a substantial tonnage. A number of steel companies in the Pittsburgh and nearby districts have surplus iron, which many of them are anxious to liquidate, and the sharp price concessions offered on the last desirable tonnage placed would indicate highly competitive bidding on such prospective orders. Merchant interests are loath to compete in such situations, but sharp discrepancies in selling prices of the various grades of iron are not unusual at a time of business stress. While Bessemer, malleable and even foundry iron might be bought at considerably under present market levels if a large tonnage came out, the fact that purchases are confined almost entirely to small lots has a stabilizing influence. Under the circumstances, these grades are still quoted at $17, Valley, and $17.50, Pittsburgh furnace, and small sales are being made at these levels. Shipments of all grades of iron are light, and little tonnage remains on sellers' order books. Jobbing foundries in the district are not running at better than 25 per cent.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$15.50 to $16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Low phos., copper free	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Basic	$16.00 to $16.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

SEMI-FINISHED STEEL

Shipments during May fell considerably under those of April because of interrupted operations on the part of non-integrated sheet and strip manufacturers. Little new buying is reported, and the market on billets, slabs and sheet bars is nominally quoted at $29 to $30, Pittsburgh or Youngstown. Forging billets are unchanged at 35, with small lots bringing $36. Wire rods have been exceptionally quiet in the last two or three weeks, reflecting lighter output on the part of bolt and nut makers and reduced demand from varied manufacturing consumers. Prices are unchanged at $35, Pittsburgh or Cleveland.

RAILS AND TRACK ACCESSORIES

The decline in shipments last month as compared with April was less than seasonal with some companies, but an explanation is offered in the spotty character of releases thus far in the year, particularly in the case of track accessories. Carriers which ordinarily order out their material according to a definite program have almost entirely departed from such schedules, and for that reason such tonnages as there are may be spread out over a longer period than usual this year. June releases have been light thus far, but may be increased later in the month. Operations at the local rail mill are lower and production of track accessories also has declined slightly.

BARS, PLATES AND SHAPES

Shipments of the heavy hot-rolled products during May compared favorably with those of April in the aggregate, although much of the tonnage constituted structural shapes and reinforcing bars. Movement of merchant bar tonnage was lighter, and plate demand declined rather sharply.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	June 2, 1931	May 26, 1931	May 5, 1931	June 3, 1930
No. 2 fdy., Philadelphia	$17.26	$17.26	$17.26	$19.76
No. 2, Valley furnace	17.00	17.00	17.00	18.50
No. 2 Southern, Cin'ti	14.69	14.69	14.69	16.69
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	18.50
Basic, del'd eastern Pa.	17.00	17.00	17.00	18.75
Basic, Valley furnace	15.50	16.50	16.50	18.50
Valley Bessemer, del'd P'gh.	18.76	18.76	18.76	20.76
Malleable, Chicago*	17.50	17.50	17.50	18.50
Malleable, Valley	17.00	17.00	17.00	19.00
L. S. charcoal, Chicago	25.04	25.04	25.04	27.04
Ferromanganese, seab'd car lots	†85.00	†85.00	†85.00	94.00

†Ferromanganese quotations adjusted to carload unit; larger quantities sold at discounts.

Rails, Billets, etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	36.00	36.00
Rerolling billets, Pittsburgh	29.00	29.00	30.00	31.00
Sheet bars, Pittsburgh	29.00	29.00	30.00	31.00
Slabs, Pittsburgh	29.00	29.00	30.00	31.00
Forging billets, Pittsburgh	35.00	35.00	36.00	37.00
Wire rods, Pittsburgh	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.65	1.65	1.65	1.70

Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.65	1.65	1.75
Bars, Chicago	1.70	1.70	1.70	1.85
Bars, Cleveland	1.65	1.65	1.70	1.75
Bars, New York	1.98	1.98	1.98	2.08
Tank plates, Pittsburgh	1.65	1.65	1.65	1.70
Tank plates, Chicago	1.70	1.70	1.70	1.80
Tank plates, New York	1.93	1.93	1.93	1.98
Structural shapes, Pittsburgh	1.65	1.65	1.65	1.70
Structural shapes, Chicago	1.70	1.70	1.70	1.80
Structural shapes, New York	1.90½	1.90½	1.90½	1.90½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.70
Cold-rolled strips, Pittsburgh	2.15	2.15	2.15	2.45

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel, *Per Lb. to Large Buyers:*	June 2, 1931 Cents	May 26, 1931 Cents	May 5, 1931 Cents	June 3, 1930 Cents
Sheets, black, No. 24, P'gh	2.15	2.15	2.15	2.55
Sheets, black, No. 24, Chicago dist. mill	2.35	2.35	2.35	2.65
Sheets, galv., No. 24, P'gh	2.80	2.80	2.80	3.20
Sheets, galv., No. 24, Chicago dist. mill	2.90	2.90	2.90	3.30
Sheets, blue, No. 13, P'gh	2.00	2.00	2.00	2.15
Sheets, blue, No. 13, Chicago dist. mill	2.10	2.10	2.10	2.25
Wire nails, Pittsburgh	1.80	1.80	1.90	2.15
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.20
Plain wire, Pittsburgh	2.20	2.20	2.20	2.50
Plain wire, Chicago dist mill	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh	2.55	2.55	2.55	2.80
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	2.85
Tin plate, 100 lb. box, P'gh	$5.00	$5.00	$5.00	$5.25

Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	*$10.75*	$11.00	$11.50	$15.25
Heavy melting steel, Phila.	9.50	9.50	10.25	13.00
Heavy melting steel, Ch'go	8.75	8.75	9.25	12.25
Carwheels, Chicago	**10.00**	9.50	9.50	13.75
Carwheels, Philadelphia	12.00	12.00	12.50	14.50
No. 1 cast, Pittsburgh	*10.25*	11.00	11.75	14.25
No. 1 cast, Philadelphia	11.50	11.50	11.50	14.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	12.75
No. 1 RR. wrot., Phila.	11.00	11.00	11.00	15.00
No. 1 RR. wrot., Ch'go (net)	7.50	7.50	7.50	10.50

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.40	$2.40	$2.50	$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	8.62½	9.12½	9.87½	13.12½
Electrolytic copper, refinery	*8.25*	8.50	8.75	12.75
Tin (Straits), New York	*22.45*	22.75	23.25	30.12½
Zinc, East St. Louis	*3.25*	3.30	3.25	4.65
Zinc, New York	*3.60*	3.65	3.60	5.00
Lead, St. Louis	3.60	3.60	3.80	5.40
Lead, New York	3.75	3.75	4.00	5.50
Antimony (Asiatic), N. Y.	*6.30*	6.40	6.70	7.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

A fair outlet for plates in the form of skelp for electric-weld pipe mills continues, and the requirements of barge yards are fair. Otherwise, movement is confined to very small lots, and mill operations are not above 35 per cent of capacity. On structural steel, mill schedules are fairly well maintained, but the business of the smaller fabricators is spotty, and shop activity is unevenly distributed. Demand for reinforcing bars is holding up and does not compare unfavorably with that of the corresponding period in 1930. No sizable orders for reinforcing bars or shapes are reported in this district, although a local company has taken 10 barges for a West Virginia coal company which will require 1600 tons of plates.

Little interest in third quarter prices has been shown in this territory, and it seems unlikely that any change in quotations will be made. Producers feel that the bar market is becoming stabilized at 1.65c., Pittsburgh, and this price applies on small lots of plates and shapes. Contract consumers are not yet negotiating for their forward needs.

COLD FINISHED STEEL BARS

No change is reported in this market. The number as well as the size of orders is discouraging. Mills are engaged at 30 to 35 per cent of capacity, and prices seem to be holding at 2.10c., Pittsburgh.

TUBULAR GOODS

Two pipe lines from the east Texas fields have been let during the last week, and the larger order, calling for 8000 tons of material, went to the Milwaukee fabricator. The other line, calling for 6000 tons of 8 and 10-in. pipe, was placed with a Pittsburgh district maker. The Lycoming Natural Gas Co. is reported to have decided to extend its proposed line in northern Pennsylvania and New York State as far as Rochester, N. Y., and the total pipe required has been raised to about 25,000 tons. However, slight changes in the routing of this line will necessitate additional surveys which may postpone buying of the pipe for some time. Production of seamless and electric welded pipe in Pittsburgh and Youngstown is somewhat higher, but business is unevenly distributed, and some available capacity is entirely idle. Production of lapweld pipe is at about 25 per cent of capacity, and buttweld facilities are not engaged at a much higher rate. Demand for this material expanded slightly during May, but is far below seasonal expectations. Oil well casing is quiet, and little business in boiler tubes or mechanical tubing is coming out.

Several makers of pipe are making some effort to stabilize prices on buttweld material as well as on line pipe. Producers are generally quoting standard pipe for direct shipment at one point plus 5 and 2½ per cent off list, representing an advance of slightly over $1 a ton from recent levels. On line pipe the situation has been even less satisfactory, but two or three makers have refused recent orders because of exceptionally low quotations which would have to be met.

WIRE PRODUCTS

Conditions in the market for merchant wire products have not improved, and efforts are being made to

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
June 2, 1931	2.102c. a Lb.	$15.63 a Gross Ton	$9.67 a Gross Ton
One week ago	2.114c.	15.63	9.75
One month ago	2.114c.	15.79	10.33
One year ago	2.214c.	17.50	13.50
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1931	2.142c., Jan. 13	2.102c., June 2	$15.90, Jan. 6	$15.63, May 26	$11.33, Jan. 6	$9.67, June 2
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

stabilize prices, particularly on nails. One producer has established a minimum quotation of $1.80 a keg on carload shipments of nails to jobbers, and will maintain 2.20c., Pittsburgh, on manufacturers' wire. Third quarter books have not been opened, and consumers have shown little interest in forward buying.

SHEETS

With the exception of some third quarter inquiry from the automobile makers, the end of May found the sheet market quieter than it has been since last December. Scarcely any new business is coming out, and specifications call for abnormally small tonnages. Releases from electric refrigerator makers have begun to decline seasonally, but there is still a fair demand for steel furniture stock. Other fabricators of sheet steel building products have maintained their needs, but demand from jobbers is very dull. Operations are still very spotty, and most of the smaller companies are operating on an interrupted schedule. Larger producers have been able to concentrate production at individual plants, and are making every effort to achieve some regularity in production. Aggregate output of sheet steel during May scarcely exceeded 40 per cent of capacity, and current production is probably somewhat lower.

Prices seem to have firmed up a bit, as the larger mills are making strenuous efforts to achieve some sort of stability before applying the new schedules of quoting. Third quarter contracts will be solicited on the basis of recent price schedules announced by a leading producer.

TIN PLATE

While tin plate production held up fairly well last week, the current schedules of the leading producers are somewhat lower and the aggregate operating rate for the industry is now nearer 65 per cent of capacity than 70 per cent. Shipments during May were considerably ahead of April in spite of declining production and early releases indicate that June will hold up well.

STRIP STEEL

Most of the leading strip makers have opened their books for third quarter at levels announced a few days ago by a few sellers. These prices at 1.55c. and 1.65c., Pittsburgh, on hot-rolled strip and 2.15c. to 2.25c. on cold-rolled, represent an advance of $1 a ton on hot-rolled material. Demand shows little change and represents scarcely a third of available capacity.

COKE

Demand for foundry coke is still holding up fairly well, but the furnace grade continues very dull. The market on the latter is further depressed by a wide divergence in quotations, particularly in the East. In the Pittsburgh district quotations are nominal at $2.40, Connellsville.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.35c.
Squares and flats	3.85c.
Bands	2.95c.
Hoops	3.95c.
Black sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.40c.
Light plates, blue annealed (No. 10)	2.75c. to 3.00c.
Blue annealed sheets (No. 13)	2.90c. to 3.00c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.65c.
Small	2.90c. to 3.05c.
Boat	3.15c.
Track bolts, all sizes, per 100 count,	60 and 10 per cent off list
Machine bolts, 100 count,	60 and 10 per cent off list
Carriage bolts, 100 count,	60 and 10 per cent off list
Nuts, all styles, 100 count,	60 and 10 per cent off list
Large rivets, base per 100 lb.	$3.20
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	2.05
Cement coated nails, per keg	2.05

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.

OLD MATERIAL

Scrap prices have lost further ground in the last week. Heavy melting steel is off 25c. a ton to $10.50 to $11. While no sales are reported at these figures, dealers are making no effort to get more and consumers are not interested in buying even at these levels. Hydraulic compressed sheets are also considerably weaker, a small tonnage having been sold to a mill at $10.50. The other grades of scrap are generally 25c. to 50c. a ton lower. Dealers have few orders on their books, and some of them are buying scrap for yard accumulation. On the other hand, mills apparently are not interested in adding to their stock piles, even at present figures. No reports are yet available on the prices which the railroad lists brought, but it is indicated that some scrap will be sold, as was the case last month. Last week's quotation on No. 1 heavy melting steel was shown in the adjacent price table as $10.50 to $11, through an error, and should have been $10.50 to $11.50.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$10.50 to $11.00
No. 2 heavy melting steel	9.25 to 9.75
Scrap rails	10.50 to 11.00
Compressed sheet steel	10.00 to 10.50
Bundled sheets, sides and ends	8.00 to 8.50
Cast iron carwheels	11.00 to 11.50
Sheet bar crops, ordinary	11.00 to 11.50
Heavy breakable cast	8.00 to 8.50
No. 2 railroad wrought	10.50 to 11.00
Hvy. steel axle turnings	9.00 to 9.50
Machine shop turnings	6.50 to 7.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	13.00 to 13.50
Railr. coil and leaf springs	13.00 to 13.50
Rolled steel wheels	13.00 to 13.50
Low phos. billet and bloom ends	14.00 to 14.50
Low phos. mill plates	12.00 to 12.50
Low phos. light grades	12.00 to 12.50
Low phos. sheet bar crops	13.00 to 13.50
Heavy steel axle turnings	9.00 to 9.50
Electric Furnace Grades:	
Low phos. punchings	13.50 to 14.00
Heavy steel axle turnings	9.00 to 9.50
Blast Furnace Grades:	
Short shoveling steel turnings	6.75 to 7.25
Short mixed borings and turnings	6.75 to 7.25
Cast iron borings	6.75 to 7.25
Rolling Mill Grades:	
Steel car axles	16.50 to 17.50
Cupola Grades:	
No. 1 cast	10.00 to 10.50
Rails 3 ft. and under	12.50 to 13.00

CHICAGO

Downward Swing in Steel Output Checked as Specifications Gain

▲ ▲ ▲

CHICAGO, June 2.—This week's survey of the Chicago steel market discloses nothing of a distinctly promising nature. However, the downward swing in production is being retarded by a fairly good inflow of miscellaneous business. Ingot output cannot be estimated at above 43 per cent of capacity, though there are individual units that stand at 48 per cent, and one bar mill group is retaining a 55 per cent rate.

The leading producer has blown out a stack at Gary, which is a reflection of lower rail rolling schedules and the tendency to make greater use of scrap at prevailing low prices. There are now in blast thirteen steel mill furnaces of 36 in the district.

New sales of finished steel are slightly under the average for the past six weeks, while specifications are the heaviest in four weeks. Releases are strongly influenced by steel for buildings and bridges and the needs of pipe manufacturers, but at the same time mill shipping schedules are lighter in standard-section rails.

Buyers' appraisals of the third quarter are still uncertain factors. Virtually no interest is being shown in future needs of heavy finished steel, and only scattered inquiries give slight inkling of consumers' attitude in the light steel and pig iron markets. Wire producers have opened third quarter books and pig iron producers are willing to open negotiations at present price levels. Next quarter's quotations on cold-rolled strip will be unchanged from present prices, but an attempt is being made to raise hot-rolled strips by $2 a ton. Sheet sellers are looking toward higher prices for the coming quarter.

Largest steel specifications in four weeks aid in checking decline of steel production.

* * *

Ingot operating rate for district now at about 43 per cent of capacity.

* * *

Gary blast furnace blown out, leaving 13 active steel mill stacks of 36 in district.

* * *

Steel releases principally for buildings, bridges and pipe.

* * *

Scrap market steadier, with one price advance and only a few declines.

▼ ▼ ▼

PIG IRON

The second quarter has been characterized by a fairly steady flow of purchases that for the most part have been gaged by what foundries have estimated was needed for work at hand. This situation has given rise to the condition wherein stocks of iron at points of consumption are light. The question is, how will users view requirements for the third quarter? Producers have opened books at present price levels, but so far interest is indicated only by a few scattered inquiries. It is not improbable that users will continue to move cautiously through the summer months, particularly in view of the service being extended by furnaces. Southern iron is holding at $11, Birmingham, for delivery to this district. Purchases up to a few carloads each affirm the intention of producers to hold to this figure. The charcoal iron market is dull both as to buying and as to releases.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, copper free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

FERROALLOYS

Although shipments are receding in volume, the change is very slow and probably more pronounced in the case of steel mills than where small users are involved. Several small inquiries are in the market for spiegeleisen.

SHEETS

Prices on sheets to be delivered during the third quarter are still undetermined. Several sellers representing producers to the east of Chicago are expecting new price schedules, and Chicago producers are noncommittal except on the one point—that advances are being contemplated. Hot mill output is variable. Near the end of May sufficient orders were at hand to start mills at the opening of the week, but now not all units are able to run out the week. A number of units do not now start rolling until the second day of the week. For the district as a whole, production ranges from 40 to 45 per cent of capacity. The roofing trade is in an in-between period when business is normally quiet. The result is that this industry is finding little use for sheets and probably will not again inaugurate a buying movement until late July or early August.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 2.95c. to 3.05c.; No. 10 blue ann'l'd, 2.00c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

CAST IRON PIPE

This market has dropped back to a very moderate pace, and opinion is varied as to the course of business in the coming mid-summer months. Private buying is dull. The railroads have been inactive throughout the year, but until recently public utilities have been making use of fair quantities of cast iron pipe. The possibilities in this market seem to hinge on plans of a large number of municipalities, which to date have been rather slow in getting projects to the working stage. McWane Cast Iron Pipe Co. has taken 17,000 ft. of 6-in. pipe for Freeburg, Ill., and a contractor has awarded 400 tons of 20 to 24-in. pipe for Huron, S. D. It is reported here that Detroit has awarded 1900 tons to the United States Pipe & Foundry Co. and R. D. Wood & Co., and that Cedar Rapids, Iowa, has closed for 300 tons. Chicago's 5000 tons of large diameter pipe is still pending.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $43 to $44; 4-in., $46 to $47; Class A and gas pipe, $3 extra.

REINFORCING BARS

With building work at the lowest point in several years, the reinforcing bar trade is concentrating on public road and bridge work, which in Illinois makes almost exclusive use of rail steel reinforcing bars. Therefore market activity at present centers largely in the rail steel commodity. Cook County, Ill., will open bids June 16 on road work that will require 1500 tons of bars, and the State of Illinois is taking bids on six bridges requiring 500 tons of bars. In the meantime, there is a steady flow of orders from contractors through warehouses to rail steel bar mills that are now comfortably booked for at least two months. In northern Illinois, 1.65c. a lb. is the prevailing quotation on rail steel bars for roads, but prices are lower on contracts in the central and southern part of the State, where Chicago and St. Louis mills meet in competition.

BARS

Mills in this district continue to produce above the average of finishing mills on other products. There is a heavier demand for mild steel bar products for concrete reinforcement, and use in other directions is fairly steady. One unit that about a week ago stepped up to 55 per cent of capacity is holding that pace and evidently will continue to do so in the immediate future. The trend of demand for alloy bars is downward in line with production in the automobile field. There is virtually no demand for iron bars, but rail steel bar mills are holding output at 65 to 70 per cent of capacity.

STRUCTURAL MATERIAL

Awards at 7500 tons and fresh inquiries of more than 15,000 tons make this week stand out rather sharply, although there is at the moment not a great deal in sight that will keep estimators busy later in the month. Word is being passed around that bids will be taken in July on the Chicago Post Office, and at least one additional World's Fair building is being revived. Most fabricators report better operations, and even some of the larger shops find that backlogs are holding. A few small shops that do work of a very miscellaneous character are still in need of orders. Prices for structural steel are steady at 1.70c. to 1.80c. a lb., Chicago.

PLATES

The Northern Pacific has placed orders for underframes and superstructure sets that will require 3800 tons of steel. This is about the extent of news in the railroad field, except that the Chicago & Alton is calling a number of shop workers back to work. Orders for oil storage tanks remain light and there seems to be nothing in sight that will better this market. Releases of skelp for line pipe manufacture are somewhat larger, but this is not of great significance because specifications fluctuate rather widely when an old pipe contract is finished and when a new one is started.

WIRE PRODUCTS

Demand for wire and wire products is gradually turning downward. Production ranges from 35 to 40 per cent of capacity. Backlogs are also growing lighter. Sellers are opening third quarter books at current quotations. Farm communities are making little use of wire products at this time of year, and the pace of manufacturing consumers is slowing. Demand for copper wire is slack. The use of wire rope is far below expectations at this time of year. The one bright spot in the wire market is the rather heavy demand for mesh for use as concrete reinforcement.

RAILS AND TRACK SUPPLIES

New orders for standard-section rails are limited to scattered lots of only a few hundred tons each. In addition to this situation, lower releases account for rail mill production sliding off to about 35 per cent of capacity. Sales of track supplies are almost absent from the market, though specifications against old orders are at the average of recent weeks.

COLD-ROLLED STRIP

Third quarter books have been opened at 2.15c. a lb., Cleveland, or 2.43c., delivered Chicago. There will be, however, an effort to reinstate the Cleveland price of 2.25c. on small lots to be delivered in the third quarter. Demand remains sluggish. Output is not above 30 per cent of capacity.

HOT-ROLLED STRIP

Producers in this district are opening third quarter books and are announcing that the lower prices in the spreads of current quotations will not exist on business for the coming quarter. This is in effect an advance of $2 a ton, bringing strips 6 in. and narrower to 1.75c. a lb. and wider than 6 in. to 1.65c. Demand for this commodity, though slow for this time of year, is steady.

BOLTS, NUTS AND RIVETS

Third quarter contracts are being written at current quotations and contracting will be well under way before the end of the week. Demand continues to give ground. Output is from 35 to 40 per cent of capacity. Many small lots of special bolts and nuts continue to be the feature of the market.

COKE

Shipments of by-product foundry coke are slowly moving downward. Prices are steady at $7.50 a ton, local ovens.

OLD MATERIAL

Although tendencies in this market are still mixed, there are grounds on which some dealers base opinion that the market will move more or less laterally through the summer months. Except in a few instances, supplies appear to be reasonably well adjusted to consumption, which in the main has changed little in the past several weeks. Some dealers feel that short orders will prove costly if held any length of time, but at present it is rather difficult to find a set of conditions that would start the market moving upward. The proportionate use of scrap at steel mills is heavy, and there are fewer restrictions now than when operations were at the spring peak. It is argued by some that the market is unusually sensitive and that only a slight change in some conditions would send it on an upward course. There is used as an illustration the present situation in cast iron wheels, which are being bid up $1 in an effort to bring in supplies needed to cover shortages on old contracts.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.90c.
Reinforcing bars, billet steel	1.65c. to 2.00c.
Rail steel reinforcement—	
For buildings	1.45c. to 1.65c.
Highway slabs	1.65c.
For bridges and culverts	1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.35c.
Flats and squares	3.85c.
Bands, ¼ in. (in Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)	3.65c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes (⅜ in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach and lag screws	60 and 10
Hot-pressed nuts, sq., tap. or blank,	60 and 10
Hot-pressed nuts, hex., tap. or blank,	60 and 10
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:		
Heavy melting steel	$8.50 to	$9.00
Shoveling steel	8.50 to	9.00
Frogs, switches and guards, cut apart, and misc. rails	8.50 to	9.00
Factory hyd. comp. sheets	7.00 to	7.50
Drop forge flashings	6.00 to	6.50
No. 1 busheling	6.75 to	7.25
Forg'd cast and r'l'd steel carwheels	11.00 to	11.50
Railroad tires, charg. box size	11.50 to	12.00
Railroad leaf springs cut apart	11.00 to	11.50
Axle turnings	7.00 to	7.50
Acid Open-Hearth Grades:		
Steel couplers and knuckles	9.75 to	10.25
Coil springs	11.50 to	12.00
Electric Furnace Grades:		
Axle turnings	7.50 to	8.00
Low phos. punchings	10.75 to	11.25
Low phos. plates, 12 in. and under	10.50 to	11.00
Blast Furnace Grades:		
Cast iron borings	3.75 to	4.00
Short shoveling turnings	3.50 to	4.00
Machine shop turnings	3.50 to	4.00
Rolling Mill Grades:		
Rerolling rails	10.50 to	11.00
Cupola Grades:		
Steel rails, less than 3 ft.	10.50 to	11.00
Steel rails, less than 2 ft.	11.50 to	12.00
Angle bars, steel	10.00 to	10.50
Cast iron carwheels	10.00 to	10.50
Malleable Grades:		
Railroad	9.75 to	10.25
Agricultural	9.50 to	9.75
Miscellaneous:		
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relaying rails, 65 lb. and heavier	22.00 to	27.00

Per Net Ton

Rolling Mill Grades:		
Iron angle and splice bars	9.00 to	9.50
Iron arch bars and transoms	10.50 to	11.00
Iron car axles	17.50 to	18.50
Steel car axles	11.50 to	12.00
No. 1 railroad wrought	7.50 to	8.00
No. 2 railroad wrought	7.50 to	8.00
No. 1 busheling	6.00 to	6.50
No. 2 busheling	4.00 to	4.50
Locomotive tires, smooth	11.50 to	12.50
Pipes and flues	5.50 to	6.00
Cupola Grades:		
No. 1 machinery cast	9.00 to	9.50
No. 1 railroad cast	8.00 to	8.50
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.25 to	6.75
Grate bars	6.00 to	6.50
Brake shoes	6.00 to	6.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

CLEVELAND — Continued Decline in Steel Demand Due Largely to Automobile Industry

CLEVELAND, June 2.—Demand for finished steel still shows a downward tendency. This is due in large measure to declining specifications from the motor car industry. Aggregate tonnage entered during May showed a moderate decrease from that of the previous month. Demands for steel from industries outside of the automotive field are light, as plant operations are sharply restricted, and orders are limited to small lots for early needs.

Local steel plant operations were reduced to 53 per cent of ingot capacity this week by the shutting down of one open-hearth furnace. Local plants are now operating 18 open-hearths of 34. This is the first change since early in April. Local blast furnace operations have been reduced by the blowing out May 30 of one of the Central furnaces of the American Steel & Wire Co.

Demand for steel from the motor car industry is expected to decline further this month. A reduction is reported in the June schedules of Chevrolet to 72,000 cars and 10,000 trucks.

The building field at present appears to be the most promising outlet for steel. There are approximately 50 Government building projects, for which inquiries will start to come out shortly. Considerable highway bridge work is still in prospect. The Navy Department plans the building of 11 torpedo boats, requiring 8000 or more tons of steel. Orders for considerable sheet steel piling are in prospect for various dock improvement jobs.

Steel prices are fairly well stabilized at recent levels. No interest is being shown in third quarter contracts aside from inquiries from a few automobile manufacturers.

IRON ORE

Water shipments of Lake Superior ore during May were 1,769,295 tons, against 6,979,213 tons during May last year. Shipments to June 1 were 1,945,216 tons, a decrease of 5,141,916 tons, or 72.55 per cent, compared with the same period last year.

PIG IRON

Sales the past week, while very light, were about the same in volume as during the previous week or two, indicating perhaps that the demand has about reached the low point. All business is in small lots for early needs. No interest is being shown in third quarter contracts. Shipping orders from the motor car industry show a downward tendency. Other consumers are taking iron at their recent rate. Prices are firm at recent quotations. Orders are not large enough to bring out concessions were producers inclined to shade prices. Lake furnaces quote foundry and malleable iron at $16 to $17 for Ohio and Indiana shipment and at $17 to $17.50 for Michigan. For Cleveland delivery, $17, furnace, is quoted.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable	17.50
Ohio silvery, 8 per cent	25.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $3 from Jackson, Ohio; $6.01 from Birmingham.

BARS, PLATES AND SHAPES

Business taken in May declined from that in April, this being particularly true of steel bars, the demand for which has flattened out sharply. Reinforcing bars are quiet. Activity in plates is limited to small lots. A Cleveland municipal hospital, requiring 620 tons of steel, was the only sizable structural job placed in this territory during the week. Bids will be taken June 16 on the Ohio River bridge at Henderson, Ky., requiring 30,000 tons. Prices are steady at 1.70c., Cleveland, for steel bars for local delivery and at 1.65c. for outside shipment and 1.65c., Pittsburgh, for plates and shapes.

STRIP STEEL

The volume of business in hot-rolled strip has declined. Additional mills have announced that they will hold to 1.55c., Pittsburgh, for wide strip and 1.65c. for narrow for the third quarter. While most of the larger consumers are under contract at $1 a ton lower, a few small current orders have been taken at the price advance. Cold-rolled strip is unchanged at 2.15c. to 2.25c., Cleveland, and, while some effort is being made to establish the higher price as a minimum for the coming quarter, it seems rather probable that large-lot buyers will be able to contract at 2.15c.

SHEETS

While new business is light, the recent volume was maintained the past week. Orders are fair in number, but for small lots. A few automobile companies have inquired for prices for third quarter contracts, but no sales are reported for that delivery. An increasing amount of small-lot business is being taken under the new classification. While this classification appears generally satisfactory to consumers, some uncertainty is expressed as to whether the new base prices will hold and these have not yet been tested. Some fill-in tonnage is coming from the Fisher Body Corpn., which is maintaining recent schedules on Chevrolet bodies. However, a slowing down in business from the motor car industry is expected this month. Steel barrel manufacturers are inquiring for 2500 tons of black sheets against a large barrel inquiry from an Eastern refining company. Should the new base price be maintained, barrel manufacturers will pay $3 a ton more for black sheets than at present and are asking higher prices for their product. For June shipment, 2.15c., Pittsburgh, is still rather commonly quoted on black sheets.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex	3.40c.
Cold-fin. flats and sq.	3.90c.
Hoops and bands, No. 12 to 7/8 in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Black sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	4.00c.
Blue ann'l'd sheets (No. 10)	3.00c.
No. 9 ann'l'd wire, per 100 lb	$2.35
No. 9 galv. wire, per 100 lb	2.80
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

OLD MATERIAL

Activity is confined to small-lot purchases by dealers. A local consumer is taking blast furnace scrap and Valley district mills are restricting shipments. Small lots of heavy melting steel for a local mill were sold during the week at $9.50 for No. 1 and $9 for No. 2. Dealers are paying $5.50 for machine shop turnings for delivery to another mill. Purchases are reported by Valley dealers at $10.50 for No. 1 heavy melting steel, $9.50 for compressed sheet steel and $6.50 to $7 for machine shop turnings. The trade has received word that a reduction on scrap of about 30c. a ton from Flint, Mich., to Youngstown and Pittsburgh will be placed in effect June 12. Prices are unchanged.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$9.50 to	$9.75
No. 2 heavy melting steel	9.00 to	9.50
Compressed sheet steel	8.25 to	8.75
Light bundled sheet stampings	7.00 to	7.50
Drop forge flashings	7.00 to	7.25
Machine-shop turnings		5.50
Short shoveling turnings	6.25 to	6.75
No. 1 railroad wrought	9.50 to	10.00
No. 2 railroad wrought	10.00 to	10.50
No. 1 busheling	7.50 to	8.00
Pipes and flues	5.50 to	6.00
Steel axle turnings	7.50 to	8.00
Acid Open-Hearth Grades:		
Low phos., billet bloom and slab crops	14.00 to	14.50
Blast Furnace Grades:		
Cast iron borings	6.25 to	6.75
Mixed borings and short turnings	6.25 to	6.75
No. 2 busheling	6.00 to	6.25
Cupola Grades:		
No. 1 cast	10.00 to	10.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft.	15.00 to	15.50
Miscellaneous:		
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

NEW YORK

Steel and Pig Irón Markets Are Generally Dull

NEW YORK, June 2.—Inquiry for pig iron has improved, but actual buying is still held back by caution, accentuated of late by stock market declines. Prospective business before the trade totals fully 5000 tons. One inquiry for 1500 tons calls for delivery outside of this territory. Another from H. Weiskittel, Baltimore, is for 500 to 2000 tons. Most inquiries are for moderate lots, ranging from 500 tons down to a carload. Sales in this territory totaled 3500 tons, or about the same amount as in the previous week. The largest transaction reported was the purchase of 1000 tons of malleable by the Malleable Iron Fittings Co., Branford, Conn. The Eastern Malleable Iron Co., Naugatuck, Conn., reports that it is not in the market.

Prices are highly sensitive, but have undergone no further general reductions. Furnaces able to ship by water are figuring prominently in current competition.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$19.91 to $20.41
*Buff. No. 2, del'd east. N. J.	18.28 to 18.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	17.39 to 17.89
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	17.89 to 18.39

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

FINISHED STEEL

Efforts to strengthen the steel price situation, which were expected to follow the recent meeting of the American Iron and Steel Institute, have not materialized to any marked extent. Considering that the third quarter is so close at hand and that most consumers are covered on contracts for the current quarter, there is not likely to be much indication of a stiffer price attitude until the time comes for writing up new contracts. Makers of hot-rolled strip steel have, however, announced that third quarter prices will be 1.55c., Pittsburgh, for wide material and 1.65c. for narrow, or $1 a ton above prices that have been ruling on recent business. Although some mills state that their minimum on black sheets is 2.25c., Pittsburgh, this material is still available at 2.15c. when the business is attractive. Galvanized sheets are generally 2.75c to 2.80c. Prices on bars and structural shapes appear to be fairly steady at 1.65c., Pittsburgh. Eastern mills quote 1.75c. to 1.80c., f.o.b. mill, for shapes. Plates, however, are subject to occasional concessions to 1.70c., Coatesville, Pa., with usual small lots at 1.75c. and 1.80c.

So far as the volume of business is concerned, there is little new to report. One or two selling offices have had spurts of good business, but the general tone of the market is extremely dull.

CAST IRON PIPE

Inquiry for pressure pipe totals close to 15,000 tons, more prospective business than has been in the market for some weeks. Included are 3500 tons of 16-in. and larger pipe for Lancaster, Pa., 500 tons of small sizes for Hartford, Conn., 200 tons for Lynn, Mass., 500 tons of 6 to 10-in. for Yorktown Heights, N. Y., 500 tons of 6 to 10-in. for Canajoharie, N. Y., and about 1500 tons for a town waterworks in Westchester County. Recent awards of pipe include 500 tons of pipes and fittings for New York to the Warren Foundry & Pipe Co. and 500 tons of large size pipe placed with the same company by a public utility in New Jersey. Prices are being maintained with greater firmness than for some time, but show no advance.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $33.90 to $35.90; 4-in. and 5-in., $36.90 to $38.90; 3-in., $43.90 to $45.90. Class A and gas pipe, $3 extra.

REINFORCING BARS

The quotations for billet steel bars are unchanged at 1.60c. to 1.65c., Pittsburgh, or 1.93c. to 1.98c., New York, but distributers have adopted a firmer attitude toward concessions, and lower prices of $1 and occasionally $2 a ton are only offered on sizable business. Current projects include sewers in the boroughs of Bronx and Queens, requiring about 200 tons of bars each, and a building on Governor's Island, New York, about 100 tons.

COKE

The week has brought revisions of by-product prices, the New England ovens having reduced foundry coke from $11 to $10.50, delivered to points taking a freight rate of $3.10 or less. These producers are not yet booking last half business. Standard beehive foundry coke ranges from $3 to $3.25, Connellsville. Other current coke quotations follow:

Special brands of beehive foundry coke, $4 to $4.85 a net ton, ovens, or $7.71 to $8.56, delivered to northern New Jersey, Jersey City and Newark, and $8.59 to $9.43 to New York and Brooklyn; by-product foundry coke, $8.70 to $9.10, Newark or Jersey City; $9.76, New York or Brooklyn.

OLD MATERIAL

A moderate tonnage of scrap continues to move in scattered carload lots, but no sizable contracts are in prospect. No. 1 heavy melting steel is being bought for barge shipment to a Buffalo consumer at $6.50, on barge, New York, and No. 2 steel is going to a Buffalo consumer at $5.50 a ton on barge. Other grades are inactive.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$5.50 to $6.50
Heavy melting steel (yard)	4.00 to 5.00
No. 1 hvy. breakable cast	6.50
Stove plate (steel works)	4.25 to 4.50
Locomotive grate bars	4.25 to 4.50
Machine shop turnings	2.00
Short shoveling turnings	2.00
Cast borings (blast fur. or steel works)	2.25
Mixed borings and turnings	1.75 to 2.00
Steel car axles	12.50 to 13.00
Iron car axles	16.50 to 17.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	6.25
Forge fire	5.00 to 5.50
No. 1 railroad wrought	8.25
No. 1 yard wrought, long	7.25
Rails for rolling	7.00 to 7.50
Stove plate (foundry)	4.50
Malleable cast (railroad)	8.50 to 9.00
Cast borings (chemical)	8.00 to 8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$12.00 to $12.50
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)	10.00 to 10.50
No. 2 cast (radiators, cast boilers, etc.)	9.50 to 10.00

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The S. M. Jones Co., Toledo, Ohio, has been licensed by the Dardelet Threadlock Corpn., New York, to manufacture and sell sucker rods having the Dardelet self-locking screw thread.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'l'd sheets (No. 10)	3.00q. to 3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
⅝ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	**Per 100 Ft.**
Lap welded, 2-in	$19.00
Seamless steel, 2-in	20.25
Charcoal iron, 2-in	26.25
Charcoal iron, 4-in	67.00

PHILADELPHIA

Steel Mill Operations Off—Pig Iron Prices Lack Strength

PHILADELPHIA, June 2.—Sentiment is somewhat mixed, certain sheet consumers noting a slight improvement in demand for their products, while activity in the heavier steel products is less. Operating rates of eastern Pennsylvania mills have receded again, and the average is slightly above 35 per cent, except for the leading independent interest, which is at about 42 per cent. Sizable projects requiring steel have almost disappeared from the market.

The Pennsylvania Railroad has awarded electrical equipment for 150 electric locomotives, 60 per cent of the order going to the Westinghouse Electric & Mfg. Co. and 40 per cent to the General Electric Co. Contract for the locomotives will be let shortly.

PIG IRON

Demand for foundry iron is generally limited to carload lots, on which $16.50 a ton, furnace, applies. On more desirable business, this price has been slightly shaded, both for No. 2 plain and by reducing the usual 50c. extra for No. 2X iron. Southern iron continues at $11 a ton, Birmingham, and offers only occasional competition at the present level of eastern Pennsylvania quotations. About 100 tons of low phosphorus iron for the Panama Canal Commission has been awarded to an importer, but bids on 100 tons of low phosphorus for the Washington Navy Yard, on which foreign iron was low, have been rejected. Although buying by eastern Pennsylvania consumers of low phosphorus is small, prices are being maintained.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$17.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	17.76
East. Pa. No. 1X	18.26
Basic (del'd east. Pa.)	17.00 to 17.25
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

STEEL BARS

Buying is mostly in small lots, on which 1.65c., Pittsburgh, or 1.94c., Philadelphia, is quoted, while larger requirements bring a price of 1.60c., Pittsburgh, or 1.89c., Philadelphia. Billet steel bar prices are unchanged at 1.65c., Pittsburgh, for small lots and $1 and $2 concessions for the larger lots. Rail steel bars are quoted at 1.20c. to 1.30c., Pittsburgh, or 1.49c. to 1.59c., delivered Philadelphia. An inquiry is in the market for a dam at Cumberland, Md., requiring 300 tons of bars.

SHAPES

With most current buying limited to small lots, mills are maintaining 1.70c. to 1.75c., f.o.b. nearest mill to consumer, or 1.76c. to 1.81c., Philadelphia. The smaller fabricating shops are in need of tonnage and are quoting on only a few projects. Recent awards include a chapel for Girard College, 800 tons.

PLATES

Operating rates of plate mills in this district have receded further in the past week, with only small tonnages being booked, mostly for prompt delivery. Quotations, however, are generally unchanged at 1.70c. to 1.75c., Coatesville, Pa., or 1.80½c. to 1.85½c., delivered Philadelphia.

SHEETS

Certain consumers of sheets are fairly active, especially manufacturers of stoves and sheet metal containers. While the radio industry is only moderately busy, the leading makers are planning to enter into their season of production within the next 30 days and have been inquiring for small lots of sheets. Prices are unchanged. Black sheets are quoted at 2.25c., Pittsburgh, or 2.54c., Philadelphia, but on desirable business, concessions of $1 to $2 a ton have not been entirely eliminated. Galvanized sheets range from 2.75c. to 2.80c., Pittsburgh, or 3.04c., to 3.09c., Philadelphia, with $2 a ton concessions from 2.80c., Pittsburgh, occasionally granted to the larger distributers. Blue annealed sheets are 2c., Pittsburgh, or 2.29c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.85c., Pittsburgh, or 2.14c., Philadelphia.

WAREHOUSE BUSINESS

Black and galvanized sheet prices have been reduced $2 a ton to 3.40c., base, for black and 3.85c., base, for galvanized. Buying has been smaller in the past week than at any time in the past two months.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ⅛-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.40c.
†Galvanized sheets (No. 24)	3.85c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'l'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 3.65c. base; 1 to 9 bun., 3.90c. base.
†For 50 bundles or more; 10 to 49 bun., 4.20c. base; 1 to 9 bun., 4.55c. base.

IMPORTS

In the week ended May 29, importations at this port consisted solely of 266 tons of structural shapes from Belgium.

OLD MATERIAL

All grades of scrap are quiet, and prices show a continued downward trend, based on small transactions and offers to sell by holders of scrap. The consumer at Bethlehem, Pa., since buying a small tonnage of No. 1 heavy melting steel at $9, delivered, is offering only $8, and has placed a small order for this grade at $8.50 a ton, delivered to its Sparrows Point, Md., plant. Machine shop turnings and No. 2 heavy melting steel are still being shipped to the consumer at Phoenixville, Pa.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$9.00 to $10.00
No. 2 heavy melting steel	7.00 to 7.50
Heavy melting steel (yard)	6.50 to 7.00
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets (for steel works)	6.50
Hydraulic compressed, new	7.50 to 8.50
Hydraulic compressed, old	6.50 to 7.00
Machine shop turnings (for steel works)	5.00 to 6.00
Heavy axle turnings (or equiv.)	8.00 to 8.50
Cast borings (for steel works and roll. mill)	5.00 to 6.00
Heavy breakable cast (for steel works)	10.50
Railroad grate bars	8.00 to 8.50
Stove plate (for steel works)	8.00 to 8.50
No. 1 low phos., hvy. (0.04% and under)	15.00
Couplers and knuckles	12.50 to 13.00
Rolled steel wheels	12.50 to 13.00
No. 1 blast f'nace (nom.)	4.50
Wrot. iron and soft steel pipes and tubes (new specific.)	11.00 to 11.50
Shafting	16.50 to 17.00
Steel axles	16.50 to 17.00
No. 1 forge fire	8.50 to 9.00
Cast iron carwheels	12.00 to 12.50
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	13.00 to 14.00
Steel rails for rolling	12.00 to 13.00

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"The Surface Decarburization of Steel at Heat-Treating Temperatures" is the title of Bulletin No. 18 issued by the department of engineering research, University of Michigan, Ann Arbor. The author is W. E. Jominy of the university. The 51 pages of the bulletin discuss methods of testing, the effect of pure gases, the effect of pressure on decarburization, the effect of atmospheres found in a gas-fired furnace, and steels other than eutectoid carbon steels. There are some 34 tables, as well as micrographs and drawings.

BOSTON

Further Weakness in Scrap Prices—Pig Iron Sales Off

BOSTON, June 2.—Pig iron sales slumped to about 800 tons the past week and were confined to scattered car lots, of which furnaces east of Buffalo secured the most. A melter negotiating for 1000 tons of malleable iron has still to cover. Aside from this, there is no open inquiry in the market.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.91 to $20.91
*Buffalo, sil. 2.25 to 2.75	19.91 to 20.91
†Buffalo, sil. 1.75 to 2.25	19.28 to 20.28
†Buffalo, sil. 2.25 to 2.75	19.28 to 20.28
*Ala., sil. 1.75 to 2.25	20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: $4.91 all rail from Buffalo; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

REINFORCING STEEL

Lettings the past week aggregated 700 tons, including one 300-ton lot, one of 125 tons, one of 100 tons and 175 tons in small lots. For local consumption, the market for billet steel bars is as follows: One to 5-ton lots, 3c. a lb., base, from stock; 6 to 99-ton lots, 2.40c.; 100-ton lots and larger, 2.30c. Where there is competition for round tonnages, however, concessions of $1 a ton are frequently made.

CAST IRON PIPE

Prices on domestic cast iron pipe are still weak, and generally under those quoted by the French foundry, which eliminates foreign pipe from the New England market. The United States Pipe & Foundry Co. was the low bidder on 160 tons of 8 and 12-in. pipe wanted by Fall River, Mass. That foundry's bid on Class B pipe was $35.30 a ton, delivered, which brings the price at foundry considerably under $30. That foundry also sold 100 tons of 12-in. pipe with fittings to Wilton, N. H.; the Warren Foundry & Pipe Co. sold 156 tons to Portsmouth, N. H., and the Donaldson Iron Co. sold 115 tons to Somerville, Mass. Lynn, Mass., this week closed bids on 142 tons of 6 and 8-in.

COKE

The New England Coal & Coke Co. has reduced foundry coke 50c. a ton, the price now being $10.50 a ton, delivered within a $3.10 freight rate zone. This change is the first since 1928. Other New England coke makers have revised their prices accordingly.

OLD MATERIAL

Further weakness is noted in scrap prices. Turnings, borings and mixed borings and turnings having dropped 25c. to 50c. a ton to $1 to $1.25 a ton, on cars shipping point. The American Steel & Wire Co., Worcester, Mass., has chipped off 25c. a ton on its offers for No. 1 heavy melting steel and bundled skeleton. The Worcester melter is now paying $7.50 a ton, delivered, for heavy melting steel, and $6.50 for bundled skeleton. A little pipe for Pennsylvania delivery was sold the past week at $5 to $5.25 a ton, on cars, and a few small lots of stove plate at $5, but business in all other kinds of scrap was virtually at a standstill.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$5.00 to	$5.25
Scrap T rails	5.00 to	5.25
Scrap girder rails	4.00 to	4.25
No. 1 railroad wrought	7.00 to	7.50
Machine shop turnings	1.00 to	1.25
Cast iron borings (steel works and rolling mill)	1.00 to	1.25
Bundled skeleton, long	4.00 to	4.25
Forge flashings	5.00 to	5.25
Blast furnace borings and turnings	1.00 to	1.25
Forge scrap	5.00 to	5.25
Shafting	10.00 to	10.50
Steel car axles	11.00 to	12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.00 to	5.25
Rails for rolling	7.50 to	8.00
Cast iron borings, chemical	7.10 to	8.50
No. 2 cast	5.00 to	5.25

Prices per gross ton deliv'd consumers' yards:

Textile cast	$9.00 to	$10.00
No. 1 machinery cast	9.00 to	10.00
Stove plate	5.00 to	5.25
Railroad malleable	13.00 to	13.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

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BIRMINGHAM

Pig Iron Shipments in May Less Than the Production

BIRMINGHAM, June 2.—The pig iron market remains in a sluggish condition, with buying confined to current needs and shipments on the same basis. Merchant producers did not ship their output in May. Scattered orders come in from day to day, but without consistent accumulation. Quotations still range from $12 to $13 for district business. Active furnaces number 13, the same as during the past month.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00 to	$13.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50 to	13.50
Basic	12.00 to	13.00

CAST IRON PIPE

Lebanon, Tenn., has placed 2000 tons with the American Cast Iron Pipe Co. This was the only sizable tonnage awarded the past week in this territory. Although current orders still are lagging, prospects are improving, and it is expected that more tonnage will develop as summer arrives. Prices continue at $35 to $36, base.

FINISHED STEEL

Inquiry mail of the past two weeks has been more favorable than for some time, but it has not brought an increase in bookings. Fabricators of structural steel are taking only small tonnages, and prospects are not very bright. Orders for reinforcing bars are also in small lots in the main, but are more numerous. Thirteen openhearths are active.

COKE

Foundry coke movement is slow and mostly on contract, with very little interest in new tonnage. The price is still $5.

OLD MATERIAL

Movement on contract has been further restricted, and there is practically no buying.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$9.50 to	$10.00
Scrap steel rails		10.00
Short shoveling turnings		7.50
Cast iron borings	(No market)	
Stove plate		7.50
Steel axles	15.00 to	16.00
Iron axles		18.00
No. 1 railroad wrought		8.00
Rails for rolling	11.50 to	12.00
No. 1 cast		10.00
Tramcar wheels	11.00 to	11.25
Cast iron borings, chem.		13.50
Cast iron carwheels		11.00

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Five booklets covering analyses of iron ore for 1931, mostly that of the Lake Superior district, have been issued by the following companies: Cleveland-Cliffs Iron Co., Ogleby-Norton Co., M. A. Hanna Co. and the Lake Superior Iron Ore Association, all of Cleveland, and Clement K. Quinn & Co. of Duluth and Cleveland.

CINCINNATI

Pig Iron Sales Largely for Rush Shipment—Scrap Still Weak

CINCINNATI, June 2.—With the working week diminished by a holiday, new orders for pig iron last week were less than in the preceding week. Bookings were about 1500 tons, all in single car to 100-ton lots for current requirements of melters. May business was about on a parity with that of April. Orders for the last several months have been sustained at 1500 to 2000 tons weekly. District consumers have built up virtually no inventories and they are therefore forced into the market for rush shipments at more frequent intervals than normally. Local foundries are operating at low rates, and the trade anticipates little or no improvement during this quarter.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
S'th'n Ohio silvery, 8 per cent	23.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

COKE

Movement of foundry grades of coke last month was a trifle better than during April, since pipe foundries were operating at a higher rate than formerly. Prices on by-product foundry coke will continue at about $9, delivered in Cincinnati, for June.

FINISHED STEEL

Despite the intervention of a holiday last week, fresh bookings by nearby sheet mills were greater than in the previous week. Mills in this district are now asking a minimum of 2.25c., Pittsburgh, for black sheets.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex	3.80c.
Squares	4.30c.
Black sheets (No. 24)	3.90c.
Galv. sheets (No. 24)	4.40c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb	10.25
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

OLD MATERIAL

The district scrap market is marked by cautiousness among both consumers and dealers. With one or two exceptions, mills are accepting shipments on old commitments, but new business is small and rare.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$8.25 to	$8.75
Scrap rails for melting	10.25 to	10.75
Loose sheet clippings	4.50 to	5.00
Bundled sheets	7.75 to	8.25
Cast iron borings	4.75 to	5.25
Machine shop turnings	5.00 to	5.50
No. 1 busheling	6.75 to	7.25
No. 2 busheling	4.25 to	4.75
Rails for rolling	11.50 to	12.00
No. 1 locomotive tires	9.50 to	10.00
No. 2 railroad wrought	8.25 to	8.75
Short rails	13.00 to	13.50
Cast iron carwheels	10.50 to	11.00
No. 1 machinery cast	12.50 to	13.00
No. 1 railroad cast	11.50 to	12.00
Burnt cast	5.25 to	5.75
Stove plate	5.25 to	5.75
Brake shoes	5.25 to	5.75
Agricultural malleable	10.00 to	10.50
Railroad malleable	11.00 to	11.50

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PACIFIC COAST

37,000 Tons of Welded Steel Pipe Awarded for Hetch Hetchy Line

SAN FRANCISCO, May 30.—Demand for steel products continues to lag on the Pacific Coast. Public works comprise the bulk of the going business. The feature of the market was the award of the Hetch Hetchy pipe line project to the Youdall Construction Co. at $4,137,000. The Western Pipe & Steel Co. secured the sub-contract for furnishing 37,000 tons of 58 to 70-in. welded steel pipe.

BARS

Awards of reinforcing steel bars totaled 2482 tons, the second largest weekly tonnage of the year. Among the larger lots placed were 350 tons for an automobile sales building in Los Angeles and 300 tons for three laboratories for the California Institute of Technology, Pasadena, both placed with unnamed interests. The Truscon Steel Co. took 242 tons for the Kress store in Sacramento. New inquiries call for 614 tons for a sewage treatment plant in Phoenix and 100 tons for an office building in Los Angeles. Bids have been opened on 268 tons for a bridge over the Santa Clara River in Ventura County, Cal. Los Angeles out-of-stock quotations are unchanged at 2.50c., base, on carload lots, while San Francisco prices hold at 2.60c. Merchant bar steel is quoted at 2.10c., c.i.f. Demand for this class of material is limited to small lots for prompt shipment.

Pig iron prices per gross ton at San Francisco:

*Utah basic	$22.00 to $24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	2.50c.
Soft steel bars	2.50c.
Black sheets (No. 24)	4.15c.
Blue ann'l'd sheets (No. 10)	3.05c.
Galv. sheets (No. 24)	4.65c.
Struc. rivets, ½-in. and larger	5.00c.
Com. wire nails, base per keg	$3.35
Cement c't'd nails, 100 lb. keg	3.35

PLATES

The award of the Hetch Hetchy pipe line, involving 37,000 tons, was the largest letting of the year. San Francisco is contemplating building an emergency pipe line which will require 15,000 tons of plates. Aberdeen, Wash., has awarded a 28-in. pipe line to a manufacturer of wood pipe. Bids were also received on cast iron, concrete and welded steel pipe, approximately 1600 tons of plates being involved in the latter type. Prices are weak at 2c., c.i.f.

SHAPES

Structural material placed during the week totaled about 2500 tons. The Dominion Bridge Co. booked 350 tons and 360 tons respectively for bridges for the Pacific Great Eastern and the C. & R. Railroad in British Columbia, while the Western Bridge Co. took 600 tons for a bridge for the Pacific Great Eastern Railroad. No award has yet been made on 800 tons for the new Post Office building in Oakland. Bids have been opened on 1715 tons of structural shapes and 304 tons of H columns for a bridge over the Santa Clara River in Ventura County, Cal. Shapes range from 2.05c. to 2.15c., c.i.f.

CAST IRON PIPE

The American Cast Iron Pipe Co. took 150 tons for various street improvement projects in Seattle, the pipe ranging from 6 to 12 in. Evans, Coleman & Evans secured 200 tons of 12-in. centrifugal pipe for Vernon, B. C. Glendora, Cal., placed 135 tons of 6 to 12-in. Class B pipe with an unnamed interest. The State of California awarded 136 tons of 4 to 10-in. Class 150 pipe for the National Guard training camp, San Luis Obispo, to an unnamed interest. Bids have been opened on 2100 tons of 12-in. centrifugal pipe for Los Angeles and on 199 tons of 6-in. Class B pipe for Calistoga, Cal.

TRACK MATERIAL

The Pacific Coast Forge Co., Seattle, booked 500 tons of track spikes and the Pacific Coast Steel Corpn. 4000 tons of tie plates for the Great Northern Railway. Seattle has opened bids on 504 tons of 70-lb. T rails and on 80 tons of 140-lb. girder rails.

SHEETS

No change in the sheet situation on the Pacific Coast is noted. Consumers continue to buy in small lots. Prices on No. 24 gage galvanized sheets hold at 3.50c., c.i.f. Black sheets, No. 24 gage, are quoted at 3c., and blue annealed, No. 10 gage, at 2.50c., c.i.f.

ST. LOUIS

A Few Grades of Scrap Higher in Price—Steel Operations Slow Up

ST. LOUIS, June 2.—Consumption of basic pig iron by mills in the St. Louis district, which had been on the increase for several weeks, was slowed up a bit during the last week, due in part to the completion of orders from the railroads. Gray iron foundries report a decrease in the melt. The stove foundries have been working on merchandise for stock, but this work is nearly completed. Malleable foundries catering to the automotive trade report light business. Pig iron prices are unchanged. Makers report the market as firm.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

FINISHED STEEL

Steel mills in the district were operating fewer heats during the last week, largely as the result of the completion of orders, especially from railroads. Buying of plates, shapes and bars continues light. Tin plate is still the bright spot of the demand. The Missouri Pacific Railway bought 1370 tons of bridge I beam spans from the American Bridge Co. More than 6000 tons of structural steel is involved in bridge work for the Illinois Highway Commission. The award of 1150 tons of reinforcing bars for reservoir covers for the St. Louis municipal waterworks went to the Missouri Rolling Mills Corpn.

OLD MATERIAL

For the first time in months there was an advance in prices of old material. Selected heavy melting steel and miscellaneous standard-section rails are 25c. a ton higher, and steel car axles and steel angle bars are 50c. a ton higher. These advances were made by dealers on items that have been scarce and which they require to fill contracts. Dealers are hopeful that the higher prices offered will stimulate shipments of the wanted items.

Railroad lists: Pennsylvania, 49,964 tons; Baltimore & Ohio, 8925 tons; Atchison, Topeka & Santa Fe, 3195 tons; Louisville & Nashville, 804 tons; Milwaukee Road and Missouri Pacific, 134 carloads each; St. Louis-San Francisco, 11 carloads; Peoria & Eastern and Missouri-Kansas-Texas, six carloads each.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$8.50 to	$9.00
No. 1 heavy melting or shoveling steel	8.00 to	8.50
No. 2 heavy melting or shoveling steel	7.25 to	7.75
No. 1 locomotive tires	10.00 to	10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	9.00 to	9.50
Railroad springs	10.00 to	10.50
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	8.00 to	8.50
No. 1 busheling	5.75 to	6.25
Cast iron borings and shoveling turnings	5.50 to	6.00
Iron rails	8.00 to	8.50
Rails for rolling	10.00 to	10.50
Machine shop turnings	2.75 to	3.25
Heavy turnings	6.00 to	6.50
Steel car axles	12.50 to	13.00
Iron car axles	17.50 to	18.00
Wrot. iron bars and trans.	9.00 to	9.50
No. 1 railroad wrought	6.00 to	6.50
Steel rails, less than 3 ft.	11.00 to	11.50
Steel angle bars	8.50 to	9.00
Cast iron carwheels	7.00 to	7.50
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	8.25 to	8.75
No. 1 railroad cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	7.50 to	8.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.60c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.65c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10

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BUFFALO

Steel-Making Operations Drop to Lowest Point Since December

BUFFALO, June 2.—Sales of pig iron the past week are estimated at about 3000 tons, nearly all in small orders. Buffalo makers are interested in a 1000-ton inquiry for malleable iron in New England, but admit that their quotations probably will prohibit the business from coming here. Another inquiry in the East is for 500 tons of foundry iron. Shipments are declining slightly.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

FINISHED STEEL

The Lackawanna plant of the Bethlehem Steel Co. has dropped its open-hearth operation to eight furnaces, the lowest since last December. Republic Steel Corpn. is operating three and Wickwire Spencer three. The Seneca Iron & Steel Co. is operating at 50 to 55 per cent. An award of 500 tons of reinforcing bars has been made by the Loblaw Groceterias, Inc., for its new Buffalo warehouse. A considerable volume of small reinforcing bars has been placed. A change has been made in the quantity differentials on warehouse materials. The base was formerly 400 to 3999 lb., with 4000 to 7999 lb. taking a 15c. reduction. The base is now 400 to 9999 lb., with the 15c. reduction applying from 1000 to 7999 lb. Effective last Friday, the prices on soft steel bars, bands and floor plates were reduced.

OLD MATERIAL

The principal consumer continues to offer $9.50 for No. 1 heavy melting steel and $8 for No. 2 steel. So far as can be learned, no large lots have been obtained at these prices. A sale of stove plates at $8 is noted.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$9.50 to	$10.00
No. 2 heavy melting scrap	8.00 to	8.50
Scrap rails	10.00 to	10.50
Hydraul. comp. sheets	8.50 to	9.00
No. 2 hydraul. comp. sheets	8.00 to	8.50
Hand bundled sheets	8.00 to	8.50
Drop forge flashings		8.50
No. 1 busheling		8.50
Hvy. steel axle turnings	8.50 to	9.50
Machine shop turnings	4.50 to	5.00
No. 1 railroad wrought	7.50 to	8.00
Acid Open-Hearth Grades:		
Knuckles and couplers	12.00 to	12.50
Coil and leaf springs	12.00 to	12.50
Rolled steel wheels	12.00 to	12.50
Low phos. billet and bloom ends	13.00 to	14.00
Electric Furnace Grades:		
Short shov. steel turnings	6.00 to	6.50
Blast Furnace Grades:		
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Rolling Mill Grades:		
Steel car axles	15.00 to	15.50
Iron axles	16.00 to	16.50
Cupola Grades:		
No. 1 machinery cast	10.00 to	10.50
Stove plate	8.00 to	8.25
Locomotive grate bars	7.00 to	7.50
Steel rails, 3 ft. and under	13.00 to	13.50
Cast iron carwheels	11.50 to	12.00
Malleable Grades:		
Industrial	10.50 to	11.00
Railroad	10.50 to	11.00
Agricultural	10.50 to	11.00
Special Grades:		
Chemical borings	9.00 to	9.50

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq	3.65c.
Rounds and hex	3.15c.
Cold-rolled strip steel	5.25c.
Black sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.20

Canada

Business in Dominion Slowly Tapering Off

TORONTO, June 2.—Business in the Canadian pig iron market received a setback because of the holiday at the beginning of last week, but there were a couple of days when sales took a spurt, and total business for the week was well sustained. No large orders were booked, melters generally adhering to hand-to-mouth buying. While the melt is unchanged, many steel plants, foundries, etc., are rapidly cleaning up back orders and, as there is little new business appearing, it is expected that production will be reduced before the end of June. Prices are unchanged.

Prices per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	20.50

STRUCTURAL STEEL

The largest booking of the week was 400 tons of steel for the Humberside Collegiate Institute, Toronto, which went to the Reid & Brown Structural Steel & Iron Works. Other orders were of 100 tons or less, and even these were restricted in number. While there is still a fairly large tonnage of prospective business pending, actual booking is slow. Fabricators are busy, although booked orders are rapidly disappearing.

OLD MATERIAL

The current demand for iron and steel scrap is negligible, according to local dealers. Sales are confined to small lots for spot needs.

Dealers' buying prices for old material:

Per Gross Ton

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	....	10.00
Stove plate	....	8.00
Standard carwheels	....	8.50
Malleable	....	8.00

Per Net Ton

No. 1 mach'ry cast	11.00	....
Stove plate	9.00	....
Standard carwheels	10.00	....
Malleable scrap	9.00	....

Steel Barrel Production Higher in April

WASHINGTON, June 2.—Production of steel barrels in April rose to 591,399 units, or 41.9 per cent of capacity, from 550,583 or 39.9 per cent of capacity in March, according to reports received from 27 establishments by the Bureau of the Census. Shipments were 600,566 and 554,332 respectively, and stocks at the end of April declined to 50,328 from 59,495 at the end of March. Unfilled orders at the end of April totaled 1,195,128 barrels from 1,253,359 at the end of March. Orders for delivery within 30 days aggregated 253,622 at the end of April compared with 242,626 at the end of March. Orders for delivery beyond 30 days amounted to 941,506 at the end of April against 1,010,733 at the end of March.

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April shipments of industrial trucks and tractors totaled 71 units, of which 48 were for domestic and 23 for export account, according to reports received by the Bureau of the Census. Shipments in March totaled 93 units, for foreign use.

Machinery Exports Slightly Higher in April

WASHINGTON, June 1.—Exports of machinery in April made a gain of $1,677,769 to reach a total of $31,077,434, compared with the March total of $29,399,665. The increase was due principally to the heavier movement of three classes, agricultural implements, oil-well machinery and forging machinery. There were several substantial declines, among the more important being in internal combustion engines, sheet and plate metal-working machines, machine tools and textile machinery.

Exports in April were $19,872,890 below those in the corresponding month one year ago. In the first four months of 1931 they dropped $78,099,768 from the total in the like period of 1930.

Industrial machinery exports in April were $12,426,231, a decline of $790,715 from March.

Imports of machinery, as listed in THE IRON AGE table, declined to $1,089,817 in April from $1,508,153 in March. A gain however, was made in imports of industrial, office and printing machinery, which rose to $694,567 from $610,986.

Imports of Machinery into the United States

(By Value)

	April		Four Months Ended April	
	1931	1930	1931	1930
Metal-working machine tools	$12,597	$63,691	$84,923	$385,438
Agricultural machinery and implements	252,574	1,809,627	2,024,062	5,860,734
Electrical machinery and apparatus	214,472	168,860	784,657	599,098
Other power-generating machinery	19,370	71,425	96,482	173,642
Other machinery	474,194	878,637	1,593,223	3,298,816
Vehicles, except agricultural	116,610	231,299	416,357	825,005
Total	$1,089,817	$3,223,539	$4,999,704	$11,142,733

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	April		Four Months Ended April	
	1931	1930	1931	1930
Locomotives	$41	$39	$68	$268
Other steam engines	2	49	86	184
Boilers	15	158	126	585
Accessories and parts	36	56	202	227
Automobile engines	400	825	1,181	3,607
Other internal combustion engines	343	973	1,548	3,379
Accessories and parts	278	347	870	1,372
Electric locomotives	95	52	232	226
Other electric machinery and apparatus	378	742	1,694	3,666
Excavating machinery	301	1,250	1,199	5,171
Concrete mixers	21	121	113	400
Road-making machinery	140	565	461	1,528
Elevators and elevator machinery	295	625	1,153	2,233
Mining and quarrying machinery	350	1,514	2,010	6,242
Oil-well machinery	1,081	2,729	5,123	10,748
Pumps	366	709	1,722	3,530
Sheet and plate metal-working machines	193	637	1,369	1,778
Forging machinery	465	216	1,437	867
Machine tools	1,805	3,344	19,247	9,086
Other metal-working machinery and parts	343	668	1,347	2,547
Textile machinery	594	737	2,324	3,448
Sewing machines	324	738	1,503	2,890
Shoe machinery	105	178	380	620
Flour-mill and gristmill machinery	50	58	130	159
Sugar-mill machinery	73	197	340	601
Paper and pulp-mill machinery	146	194	513	983
Sawmill machinery	63	57	200	340
Other woodworking machinery	115	134	397	630
Refrigerating and ice-making machinery	96	426	457	1,140
Air compressors	166	711	723	2,411
Typewriters	950	1,645	3,901	7,344
Power laundry machinery	103	150	361	624
Typesetting machines	233	417	858	1,484
Printing presses	326	671	846	1,976
Agricultural machinery and implements	6,346	11,964	45,490	61,595
All other machinery and parts	14,439	17,054	42,586	76,407
Total	$31,077	$50,950	$142,197	$220,296

Semi-Finished Steel, Raw Materials, Bolts and Rivets

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$29.00 to $30.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00 to 30.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00 to 30.00
Rerolling, 4-in. and under 10-in., Chicago	31.00 to 32.00
Forging quality, Pittsburgh	35.00 to 36.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$29.00 to $30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$29.00 to $30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.65c.
Universal	1.65c.
Sheared	1.65c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	35.00

PRICES OF RAW MATERIAL

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $12.50

	Per Gross Ton
Chrome ore, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$20.00
Chrome ore, 48% Cr_2O_3 crude, c.i.f. Atlantic seaboard	22.50

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.40
Foundry, f.o.b. Connellsville prompt	$3.25 to 4.75
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.40 to 1.50
Gas coal, ¾-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	75c. to 85c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$80.00 to $85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$28.00 to $30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

Per Gross Ton Furnace		Per Gross Ton Furnace	
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$25.00	13%	$29.00
11%	26.00	14%	31.00
12%	27.00	15%	33.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$19.00 to $21.00	11%	$22.00 to $24.00
7%	19.50 to 21.50	12%	23.00 to 25.00
8%	20.00 to 22.00	13%	25.00 to 27.00
9%	20.50 to 22.50	14%	27.00 to 29.00
10%	21.00 to 23.00	15%	29.00 to 31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd, carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	$105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$14.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00 to $43.00	$32.00 to $35.00
Maryland	40.00 to 43.00	32.00 to 35.00
New Jersey	40.00 to 43.00	.....
Ohio	40.00 to 43.00	32.00 to 35.00
Kentucky	40.00 to 43.00	32.00 to 35.00
Missouri	40.00 to 43.00	32.00 to 35.00
Illinois	40.00 to 43.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73
†Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	73
Semi-finished hexagons castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, P'gh	80, 10, 10, 5 and 2½
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland	80, 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread,	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
Del'd Philadelphia	1.94c. to 1.99c.
Del'd New York	1.98c. to 2.03c.
F.o.b. Cleveland	1.65c. to 1.70c.
F.o.b. Lackawanna	1.75c. to 1.80c.
F.o.b. Birmingham	1.80c.
C.i.f. Pacific ports	2.25c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c. to 1.65c.
F.o.b. Birmingham, mill lengths	1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.60c. to 1.65c.
Del'd Philadelphia	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago	1.70c. to 1.80c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
F.o.b. Birmingham	1.80c.
Del'd Cleveland	1.83½c.
Del'd Philadelphia	1.85½c.
F.o.b. Coatesville	1.75c.
F.o.b. Sparrows Point	1.75c.
F.o.b. Lackawanna	1.75c.
Del'd New York	1.93c.
C.i.f. Pacific ports	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
F.o.b. Birmingham	1.80c.
F.o.b. Lackawanna	1.75c.
F.o.b. Bethlehem	1.75c.
Del'd Cleveland	1.83½c.
Del'd Philadelphia	1.76c.
Del'd New York	1.90½c.
C.i.f. Pacific ports	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.60c. to 1.65c.
Wider than 6 in., P'gh	1.50c. to 1.55c.
6 in. and narrower, Chicago	1.65c. to 1.75c.
Wider than 6 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.80c. to 1.90c.
Cooperage stock, Chicago	1.80c. to 1.90c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.15c.
Strips, Cleveland	2.15c.
Strips, deliv'd Chicago	2.43c.
Strips, Worcester	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.20c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Base per Lb.
Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Lb.
Smooth annealed wire	2.25c. to 2.35c.
Smooth galvanized wire	2.70c. to 2.80c.
Polished staples	2.25c. to 2.35c.
Galvanized staples	2.50c. to 2.60c.
Barbed wire, galvanized	2.45c. to 2.55c.
Woven wire fence, per net ton	$60.00

	Base per Keg
Standard wire nails	$1.80 to $1.90
Smooth coated nails	1.80 to 1.90
Galvanized nails	3.80 to 3.90

To Retail Trade

	Base per Lb.
Bright wire	2.30c.
Smooth annealed wire	2.40c.
Smooth galvanized wire	2.90c.

	Base per Keg
Standard wire nails	$1.90 to $2.00
Cement coated nails	1.90 to 2.00
Galvanized nails	3.90 to 4.00

	Base per Lb.
Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized	2.65c.
Woven wire fence, per net ton	$65.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh	1.85c.
No. 10, blue annealed, f.o.b. Chicago dist.	1.95c.
No. 10, blue an'l'd, del'd Phila.	2.14c. to 2.19c.
No. 10, blue annealed, B'ham	2.00c. to 2.05c.
No. 10, blue annealed, Pacific Coast ports	2.50c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.00c.
No. 13, f.o.b. Chicago dist.	2.10c.
No. 13, del'd Philadelphia	2.29c.
No. 13, blue annealed, B'ham	2.15c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.15c. to 2.25c.
No. 24, f.o.b. Chicago dist. mill	2.35c.
No. 24, del'd Philadelphia	2.44c. to 2.54c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, c.i.f. Pacific Coast ports	3.00c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh	3.40c.

Galvanized

No. 24, f.o.b. Pittsburgh	2.80c.
No. 24, f.o.b. Chicago dist. mill	2.90c.
No. 24, del'd Cleveland	2.98½c.
No. 24, del'd Philadelphia	3.24c.
No. 24, f.o.b. Birmingham	2.80c. to 2.90c.
No. 24, c.i.f. Pacific Coast ports	3.50c.

Continuous Mill Sheets

No. 10 gage	1.70c.
No. 13 gage	1.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill	2.65c. to 2.75c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill:	
Unassorted	3.10c.
Assorted	3.20c.
Primes only	3.30c.

Vitreous Enameling Stock

No. 10, Pittsburgh (carloads)	3.10c.
No. 20, Pittsburgh (carloads)	3.40c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.30
15-lb. coating I.C.	12.90
20-lb. coating I.C.	14.00
25-lb. coating I.C.	$15.20
30-lb. coating I.C.	16.00
40-lb. coating I.C.	17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential
2000 (½% Nickel)	$0.25
2100 (1¼% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅜ in. and larger	$2.70
Spikes, ½ in. and larger	2.70
Spikes, boat and barge	$2.90
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49⅛	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points, with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper at 8.50c.—Tin at New Low—Zinc Declines —Lead Steady

NEW YORK, June 2.

COPPER

Effective today, Copper Exporters, Inc., reduced its quotation from 9.02½c. to 8.77½c., c.i.f. usual European ports. This was followed by fairly large buying by foreign consumers. The total sales to foreign ports during May were about 23,000 gross tons, which is a little more than the March or April volume. The reduction in the foreign price automatically lowered the domestic quotation of the primary producers to 8.50c., delivered in the Connecticut Valley, the level which has prevailed among custom smelters for about a week. Quite heavy sales have been made to American melters at 8.50c. in the last few days, and it develops that considerable business was done at this price about 10 days ago. Primary producers are not active sellers, but will probably take care of regular customers at today's price. A small tonnage is reported offered at a shade under 8.50c. but confirmation of any sales is lacking. Lake copper is quiet at 8.50c. to 8.62½c., delivered.

COPPER AVERAGES

The average price of Lake copper, based on daily quotations in THE IRON AGE, is 9.37½c. a lb. for May, delivered New York. The average price of electrolytic copper is 8.67c., refinery, or 8.92c., delivered in the Connecticut Valley.

TIN

Spot Straits tin sold during the week at the lowest price since January, 1899, or at 22.40c., New York. The lowest price in the present century was 22.60c. in 1902, and the lowest level this year was 22.75c. on two separate occasions in May. Too much tin, clearly indicated by the statistics for May, is the prime cause. The world's visible supply at the end of May was 51,231 tons, an increase of 2938 tons over that of April, and the carryover in the Straits was 6868 tons, an increase of 397 tons. Estimates place the shipments for June from the Straits at about 8500 tons, with production at 7500 tons. Stocks in British warehouses on May 30 were 30,607 tons, an increase of 770 tons for the week. As a result of these statistics, there were sales of 1250 tons of future standard tin in London today, with the report that 1000 tons of this had been purchased by a London house with the buying credited to the "Group" in order to keep the market from falling below £100 a ton. On only one day, May 29, was there much business transacted in New York. The buying was mostly short covering, with consumers showing very little interest. Quotations in London today were £100 12s. 6d. for spot standard, £102 for future standard, and £102 7s. 6d. for spot Straits. The Singapore market today was £102 10s. The New York quotation today was 22.45c. for spot Straits.

LEAD

With the market firm as to prices, a fair amount of buying has featured the week, some of it involving several lots of 100 tons each, well distributed among battery, cable and other consumers. It is estimated that, on the basis of present consumption, about 50 per cent of the June needs of users has been covered. The price of the leading interest is 3.75c., New York, with the quotation in the West at 3.60c., St. Louis.

ZINC

Owing to a lack of interest among consumers, prime Western zinc is

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	June 2	June 1	May 29	May 28	May 27
Lake copper, New York	8.62½	8.87½	8.87½	8.87½	8.87½
Electrolytic copper, N. Y.*	8.25	8.25	8.25	8.25	8.25
Straits tin, spot, N. Y.	22.45	22.40	22.75	22.40	22.87½
Zinc, East St. Louis	3.25	3.25	3.25	3.25	3.30
Zinc, New York	3.60	3.60	3.60	3.60	3.65
Lead, St. Louis	3.60	3.60	3.60	3.60	3.60
Lead, New York	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

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New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	16.25c.
*Copper, hot rolled, base sizes	18.37½c.
Seamless Tubes—	
Brass	20.75c.
Copper	20.87½c.
Brass Rods	14.12½c.
Brazed Brass Tubes	24.50c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.00c. to 9.50c.
Zinc sheets, open	10.00c. to 10.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	24.00c. to 25.00c.
Tin, bar	26.00c. to 27.00c.
Copper, Lake	10.00c. to 10.50c.
Copper, electrolytic	9.75c. to 10.25c.
Copper, casting	9.50c. to 10.00c.
Zinc, slab	4.50c. to 5.50c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	6.75c. to 7.75c.
Antimony, Asiatic	9.00c. to 10.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	17.75c. to 18.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	27.25c.
Tin, bar	29.25c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, casting	9.25c.
Zinc, slab	5.50c.
Lead, American pig	4.75c. to 4.90c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	31.50c.
Solder, ½ and ½	19.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.50c.	7.25c.
Copper, hvy. and wire	6.25c.	7.00c.
Copper, light and bottoms	5.25c.	6.00c.
Brass, heavy	3.25c.	4.25c.
Brass, light	2.75c.	3.75c.
Hvy. machine composition	5.25c.	6.00c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compos. turnings	4.75c.	5.50c.
Lead, heavy	2.50c.	3.00c.
Zinc	1.25c.	1.75c.
Sheet aluminum	10.00c.	12.00c.
Cast aluminum	5.00c.	7.50c.

quoted a little lower at 3.25c., East St. Louis, or 3.60c., New York. Some business has been done nearly every day, but it has been small. For the first time in several weeks, ore prices at Joplin have advanced and now stand at $20 to $21 a ton. Sales last week were only 2870 tons. Shipments were nearly 3500 tons, with production about 5100 tons, leaving the estimated stock at 60,100 tons, a new recent peak and higher than the large total in March, when ore was selling at $24 to $25.

ANTIMONY

In a sluggish market, Chinese metal is again a little lower at 6.30c. a lb., New York, duty paid, for spot and 6.25c. for futures.

NICKEL

Electrolytic cathodes are quoted at 35c. a lb., with shot and ingot nickel made from remelted electrolytic at 36c. a lb. for single lots of spot metal.

ALUMINUM

According to published prices, virgin metal, 98 to 99 per cent pure, is unchanged at 22.90c. a lb., delivered.

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Railroad Equipment

Pennsylvania Railroad has placed orders for electrical apparatus to be installed in 150 passenger and freight locomotives, a part of the equipment which will be used when electrification is completed on the Pennsylvania lines between New York and Washington. The electrical equipment, which will cost about $16,000,000, will be furnished by the General Electric Co. and the Westinghouse Electric & Mfg. Co. The Pennsylvania program calls for purchase also of 80 additional electric locomotives of other types. This road will soon place orders also for $1,500,000 worth of additional merchandise containers which will be built at the company's own shops.

Final deliveries will be made this week by the Pennsylvania Railroad on the $5,000,000 order for 1500 65-ft. steel gondola cars, work on which was begun early last winter in the railroad's own shops. There have already been placed in service on the Pennsylvania 1470 of these exceptionally long gondola cars, and the 30 to be turned out of shop this week will complete the order.

The new 65-ft. gondola car, the longest ever built, is designed to handle long structural shapes such as steel bars, sheets, pipes and rails.

Northern Pacific has ordered 500 underframes and 500 superstructure sets for box cars from American Car & Foundry Co.

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Orders for enameled sanitary ware in April totaled 161,317 pieces, compared with 127,220 pieces in March, according to reports from 21 manufacturers received by the Bureau of the Census.

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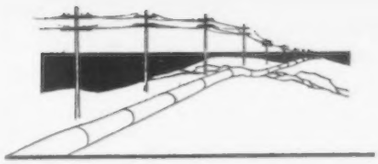
Mitsui & Co., one of the leading Japanese trading companies, will move June 8 from 65 Broadway to the Empire State Building, New York.



PIPE LINES

Magnolia Pipe Line Co. Orders 8000 Tons

THERE is a fair rate of activity in pipe line projects, though lettings are much below those of this period last year. One order is for 8000 tons of 12¼-in. electric welded pipe for the Magnolia Pipe Line Co. Lycoming Natural Gas Co. may buy 200 miles of pipe instead of 100 miles. Details of current projects follow:

Magnolia Pipe Line Co. has ordered approximately 100 miles of 12¼-in. electric welded pipe, requiring 8000 tons of steel, for a line out of the east Texas fields, from the A. O. Smith Corpn., Milwaukee.

Humble Pipe Line Co., a subsidiary of the Standard Oil Co. of New Jersey, is reported to have placed 100 miles of 8 and 10-in. seamless pipe for a line in east Texas with the Youngstown Sheet & Tube Co. and the National Tube Co. From 5000 to 6000 tons of steel will be required.

Lycoming Natural Gas Co., subsidiary of the Standard Oil Co. of New Jersey, now plans to purchase nearly 200 miles of 20-in. pipe instead of 100 miles as reported last week. The line will be extended to Rochester, N. Y., but some delay has been encountered in securing right of way. At least 25,000 tons of pipe will be required for the entire line.

Phoenix Utility Co., New York, is inquiring for about 2500 tons of small diameter pipe for various pipe line extensions.

Memphis Natural Gas Co. has signed a contract with Ford, Bacon & Davis Construction Corpn. for a 100-mile gas line extension to Jackson, Miss., and cities in western Tennessee. The plan also provides for the construction of a large compressor station near Memphis and an addition to the existing compressor station at Guthrie, La. The 6500 tons of steel pipe for this project has been ordered from the Republic Steel Corpn., instead of from the National Tube Co., as reported last week.

Texas Corpn., Dallas, Tex., is planning construction of a pipe line from Gladewater oilfield district, Gregg County, to connection with company's Joiner pool line, using 6-in. pipe.

Michigan Fuel & Power Co., Benton Harbor, Mich., has awarded contract to United Engineers & Constructors, Philadelphia, for installation of a high-pressure gas line from Benton Harbor to Watervliet, Mich., about 21 miles, using 4½-in. pipe.

Standard Oil Co. of Kansas, Eldorado Refining Co. and the Vickers Petroleum Co., are considering construction of a joint pipe line from Wichita to Rice County and neighboring oilfields, about 100 miles, with eastern terminus at Valley Center, Kan., where connection will be made with system of Empire Pipe Line Co. Project will cost about $1,000,000, with pumping stations and other equipment. Derby Oil & Refining Co. and the Lario Petroleum Co. are also planning a cooperative oil line in Kansas.

St. Louis Board of Public Service has purchased 5000 ft. of 26-in. steel pipe, a total of 456 tons, from McClintic-Marshall Corpn.

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Industrial Institute to Meet at Lake George

The Silver Bay Industrial Institute will meet at Silver Bay, Lake George, N. Y., from Aug. 10 to 25. Conferences will be held in four main divisions with R. N. Keppel, Standard Oil Co. of New Jersey, and M. J. Kane, American Telephone & Telegraph Co., chairmen of the supervisors division; W. M. Nelson, General Electric Co., chairman of the plant training division; C. R. Dooley, Standard Oil Co. of New York, chairman of the personnel division, and Harold F. Brown, National Industrial Conference Board, chairman of the smaller plants division.

Discussion in the supervisors division will be directed, so far as possible, to the solution of particular problems of men, equipment, materials and operations. In the plant training section an effort will be made to analyze and classify existing plant or company programs of education and training, and there will be discussion of methods for carrying on training within an organization. The personnel division will be devoted to employment, compensation, education, job analysis, benefits, safety, medical service, employee representation and kindred subjects. The division of smaller plants will consider the problems of the plant employing 100 to 300 workers.

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Electric Hoist Orders Rose in April

WASHINGTON, June 2.—Orders for electric hoists rose to 314 units, valued at $140,500, in April, against 297, valued at $134,316, in March, according to reports received from 13 leading manufacturers by the Bureau of the Census. Shipments were valued at $113,164 and $166,438 respectively.

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Boiler Engineering Co., builder of baffle wall for water tube boilers, has moved to the new National Newark & Essex Bank Building, 744 Broad Street, Newark, N. J.

FABRICATED STRUCTURAL STEEL

Awards of 81,500 Tons Include Pipe Line—13,700 Tons of Bridge Work in 21,000 Tons of Inquiry

AWARDS of fabricated structural steel total about 81,500 tons, placing this week among the best of the year. Awards a week ago were only 20,000 tons and two weeks ago 16,000 tons. While current business is chiefly in small contracts, about 16,000 tons has been placed for a building in Chicago for the Marshall Field Estate, 37,000 tons of plates for a welded steel pipe line in the Hetch Hetchy project in California and 4100 tons in the Mannheim Road viaduct, Chicago.

Of 21,000 tons of new inquiry, 13,700 tons is contributed by bridge construction, including 6078 tons of highway bridges in Illinois and 6000 tons in Louisiana. A Post Office in Minneapolis will require 5300 tons.

April awards of fabricated structural steel in the New York district, exclusive of subway and bridge construction, totaled only 15,155 tons, according to the Structural Steel Board of Trade. This compares with 159,044 tons in March, when the Metropolitan Square development was placed, and 26,726 tons in April, 1930. Awards for this week follow:

North Atlantic States

BOSTON, 500 tons, theater in Washington Street, to Palmer Steel Co.

BOSTON, 100 tons, city charity administration building, to New England Structural Co.

EVERETT, MASS., 150 tons, Merrimac Chemical Co., bisulphate plant, to A. L. Smith Iron Works.

HADLEY, MASS., 125 tons, Mount Holyoke College unit, to Eastern Bridge & Structural Co.

NEWPORT, R. I., 200 tons, assembly hall for Government, to a local fabricator

STATE OF NEW YORK, 150 tons, highway bridge, to American Bridge Co.

STATE OF NEW YORK, 225 tons, two highway bridges, to Genesee Bridge Co.

NEW YORK, 225 tons, bracing beams and other material for Fort Lee bridge, to Vulcan Rail & Construction Co.

NEW YORK, 750 tons, apartment building at 113th Street and Amsterdam Avenue, to Paterson Bridge Co.

NEW YORK, 200 tons, columns for Pennsylvania Railroad, Thirty-first Street and Eighth Avenue, to Shoemaker Bridge Co.

NEW YORK, 425 tons, gymnasium for New York University, to McClintic-Marshall Corpn.

ERIE RAILROAD, 170 tons, bridge at Oak Ridge, N. J., to Harris Structural Steel Co.

ERIE RAILROAD, 250 tons, bridge in New York State, to Ingalls Iron Works.

TEANECK, N. J., 650 tons, section 3, route 4 of viaduct, to McClintic-Marshall Corpn.

ENGLEWOOD, N. J., 545 tons, viaduct, to McClintic-Marshall Corpn.

BURLINGTON, N. J., 990 tons, Public Service generator building, to McClintic-Marshall Corpn.

NEWBURGH, N. Y., 100 tons, Post Office, to Gulbert Steel Co.

STATE OF PENNSYLVANIA, 260 tons, bridges in Montgomery County, to American Bridge Co.

PHILADELPHIA, 800 tons, library for Girard College, to Belmont Iron Works.

PORT JERVIS, N. Y., 260 tons, Erie Railroad bridge, to American Bridge Co.

NEW YORK, 350 tons, garage at Lafayette and Fourth Streets, to Easton Structural Steel Co.

NEW YORK, 300 tons, loft at West Thirtieth Street and Broadway, to Easton Structural Steel Co.

NEW YORK, 550 tons, apartment building, 310 East Fifty-fifth Street, to McClintic-Marshall Corpn.

NEW YORK, 370 tons, public school No. 52, to Easton Structural Steel Co.

NEW YORK, 140 tons, residence at 48 East Ninety-second Street, to Ingalls Iron Works.

NEW YORK, 800 tons, loft building at Grand Concourse and Fordham Road to Bethlehem Fabricators, Inc.

NEW YORK, 100 tons, W. T. Grant Stores at 605 West 181st Street, to Dreier Iron Works.

NEW YORK, 100 tons, airport hangars at Jackson Heights, to Austin Co.

SCARSDALE, N. Y., 100 tons, motion picture theater, to Hinkle Iron Works.

FLUSHING, N. Y., 130 tons, Michaels store, to Berkshire Iron Works.

BEDFORD HILLS, N. Y., 250 tons, building for Bedford Reformatory for Women, to Ingalls Iron Works.

WEST HAVERSTRAW, N. Y., 150 tons, ward buildings, to Ingalls Iron Works.

South and Southwest

HUNTINGDON, W. VA., 1600 tons, 10 barges for Island Creek Fuel & Transportation Co. to McClintic-Marshall Corpn.

RANCHLAND, TEX., 500 tons, bridge connecting Texas and Oklahoma, to Mosher Steel & Machinery Co.

DE KALB, TEX., 345 tons, bridge, to McClintic-Marshall Corpn.

STATE OF ARKANSAS, 480 tons, viaduct approach, to Virginia Bridge & Iron Co.

MISSOURI PACIFIC RAILROAD, 365 tons, bridge at Fulton, Ark., to American Bridge Co.

Central States

TOLEDO, 150 tons, Lucas County bridge, to American Bridge Co.

CLEVELAND, 620 tons, Tuberculosis Hospital, to Ingalls Iron Works.

CLEVELAND, 1800 tons, building for Addressograph-Multigraph Corpn., to H. K. Ferguson Co.; steel to be sublet.

CLEVELAND, 155 tons, Otis Steel Co., McClintic-Marshall Corpn.

COSHOCTON, OHIO, 300 tons, State highway bridge, to Berger Iron Works.

CLARINGTON, OHIO, 225 tons, highway bridge, to American Bridge Co.

SOUTH BEND, IND., 450 tons, dormitories at Notre Dame, to Edwards Iron Works, local.

INDIANA HARBOR, 350 tons, Inland Steel Co., to McClintic-Marshall Corpn.

CHICAGO, 650 tons, Chicago Avenue tunnel mucking machines, to Midland Structural Steel Co.

CHICAGO, 4100 tons, Mannheim Road viaduct, to an unnamed bidder.

CHICAGO, 1190 tons, Humboldt Park station, to American Bridge Co.

CHICAGO, 16,000 tons, building for Marshall Field Estate, to McClintic-Marshall Corpn.

LACROSSE, WIS., 760 tons, bridges, to Wausau Iron Works.

MINONG, WIS., 160 tons, bridge, to Lakeside Bridge Co.

ST. LOUIS, 1370 tons, bridge, I-beam spans for Missouri Pacific Railway, to American Bridge Co.

KANSAS CITY, MO., 350 tons, hangar, to Kansas City Structural Steel Co.

KANSAS CITY, MO., 185 tons, hangar for National Air Transport Co., to Austin Co.

Western States

BOULDER CITY, NEV., 100 tons, emergency outlet gates for Hoover Dam, to Kyle Steel Construction Co.

SEATTLE, 600 tons, bascule bridge for Northern Pacific Railroad, to Wallace Bridge & Structural Co.

SAN FRANCISCO, 37,000 tons, plates, 58 to 70-in. welded steel pipe for Hetch Hetchy pipe line, to Western Pipe & Steel Co.

Canada

VANCOUVER, B. C., 600 tons, bridge for Pacific Great Eastern Railroad, to Western Bridge Co.

VANCOUVER, 350 tons, bridge for Pacific Great Eastern Railroad, to Dominion Bridge Co.

LULU ISLAND, B. C., 360 tons, bridge over Fraser River for C. & R. Railroad, to Dominion Bridge Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

FRYEBURG, ME., 160 tons, State bridge.

CAMBRIDGE, VT., 100 tons, State bridge.

STATE OF NEW YORK, 1000 tons, bridges.

SYRACUSE, N. Y., 350 tons, State armory.

DANNEMORA, N. Y., 200 tons, Clinton prison.

PHILADELPHIA, 100 tons, bridge for Philadelphia & Reading Railroad.

VILLA NOVA, PA., 500 tons, gymnasium for Villa Nova College.

The South

FRANKFORT, KY., 100 tons, bridge for Kentucky Highway Commission.

STATE OF LOUISIANA, 6000 tons, highway bridges.

Central States

STATE OF OHIO, 250 tons, highway bridges, bids taken June 9.

SPRINGFIELD, ILL., 6078 tons, bridges for Illinois State Highway Commission: Cook County, 4000 tons; Effingham, 140 tons; Madison, 110 tons, bids opened June 2; Cook County, 575 tons; Dupage and Cook Counties, 350 tons; Sangamon County, 750 tons; Pulaski County, 103 tons, bids opened June 16.

QUINCY, ILL., 560 tons, high school building, Kaempen Co. of Quincy, general contractor.

MINNEAPOLIS, 5300 tons, Post Office.

MILWAUKEE, 6500 tons, Thirty-fifth Street viaduct; bids about June 15.

Western States

SAN FRANCISCO, 147 tons, apartment building for Mr. Epp; bids being taken.

Reinforcing Steel

Awards and Inquiries in Reduced Volume

OF the 6000 tons of reinforcing steel lettings the past week, the two largest awards were 1300 tons for a reservoir at Louisville and 1150 tons for two reservoir covers for the St. Louis waterworks. Other tonnages ranged from 100 to 500 tons. New projects will take about 4000 tons, 1500 tons of which is for road work in Illinois. Contracts in May, at 24,900 tons, compare with 30,950 tons in April and 30,400 tons in March. Awards follow:

MILFORD, CONN., 100 tons, Post Office, to Truscon Steel Co.

SPRINGFIELD, MASS., 300 tons, Post Office, to a Western company.

SMITHFIELD, R. I., 125 tons, storehouse, to Bancroft & Martin Rolling Mill Co.

WALKILL, N. Y., 157 tons, prison for State of New York.

BUFFALO, 500 tons, warehouse for Loblaw Groceterias, Inc., to a local company.

LOUISVILLE, KY., 1300 tons, reservoir, to Jones & Laughlin Steel Corpn.

CLEVELAND, 190 tons, Wolf Road bridge, to Truscon Steel Co.

STATE OF ILLINOIS, 100 tons, road work, to Concrete Engineering Co.

CHICAGO, 100 tons, general exhibition building for World's Fair, to Calumet Steel Co.

ST. LOUIS, 1150 tons, two covers for reservoirs for municipal waterworks, to Missouri Rolling Mills Corpn.

SACRAMENTO, CAL., 242 tons, Kress store, to Truscon Steel Co.

SACRAMENTO, 220 tons, paving work in Sacramento County, to an unnamed bidder.

SACRAMENTO, 125 tons, four bridges in Tulare County, to an unnamed bidder.

SALINAS, CAL., 200 tons, jail, to Concrete Engineering Co.

SAN FRANCISCO, 100 tons, Fifteenth Street sewer, to Soule Steel Co.

SAN FRANCISCO, 205 tons, Hetch Hetchy pipe line, to an unnamed bidder.

PASADENA, CAL., 300 tons, three laboratories for California Institute of Technology, to an unnamed bidder.

CLAREMONT, CAL., 200 tons, building for Claremont College, to an unnamed bidder.

LOS ANGELES, 350 tons, auto sales building, Wilshire Boulevard and Mariposa Street, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

STATE OF MASSACHUSETTS, 125 tons, two bridges.

NEW YORK, 200 tons, sewer for Bronx Bureau of Sewers.

NEW YORK, 200 tons, sewer for Queens Bureau of Sewers.

STATE OF NEW JERSEY, 100 tons, overpass on route 2, section 6, at Paramus; bids opened June 8.

FORT JAY, NEW YORK, 100 tons, building on Governor's Island; bids opened June 4.

CUMBERLAND, MD., 300 tons, Kuhns Creek Dam; Vang Construction Co., Pittsburgh, general contractor.

WASHINGTON, 850 tons (increased from original estimate), Capitol terrace foundation and garage; H. R. Blagg Co., Dayton, Ohio, low bidder on general contract.

WASHINGTON, 200 tons, bakery and warehouse for Walter Reed Hospital; H. R. Blagg Co., Dayton, low bidder on general contract.

COOK COUNTY, ILL., 1500 tons, road work.

STATE OF ILLINOIS, 500 tons, six highway bridges.

MILWAUKEE, tonnage being estimated, five-story building for Swift & Co.

PHOENIX, ARIZ., 614 tons, sewage treatment plant; bids opened.

LOS ANGELES, 100 tons, office building, 2428 McPherson Street; bids being taken.

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Welded Pipe New Outlet for Continuous Mill

(*Concluded from page* 1839)

of 24-in., formed with No. 3 gage sheets.

Lighter weight of the pipe, gage for gage, is said to be possible through exclusion of unused metal at the spiral weld. The exterior weld metal is ground off flush with the pipe at the ends, for welding on standard flanges, or for use with the usual couplings. Pipe is furnished plain or in four types of coating; mill coat, asphalt dip, leadized or hot-dip galvanized.

All sections are hydraulically tested at double the working pressure, the pressure being determined by using a fiber stress based on the ultimate tensile strength with a safety factor of four. The pipe is made to a weight tolerance of not more than 3.50 per cent under or 10 per cent over the weight specified, to a length tolerance within ⅛ in. plus or minus the exact length specified, and to a tolerance for roundness of not more than 1/16 in., plus or minus.

As the spiral welding machine cannot function unless the pipe is straight and true-round, the finished product is uniform, it is stated. It is emphasized that the spiral weld adds to the rigidity and strength of the pipe. The interior is smooth, so that a minimum of sediment collection is claimed, as well as decreased pumping costs.

Installations of spiral welded pipe have been made for transport of oil and natural gas, and it is being recommended by the maker for stock and water lines and for use in paper mills. It is also being used for low-pressure or exhaust steam lines and similar purposes where light-wall pipe is desirable because of suitability and economy.

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Sales of mechanical stokers in April totaled 65 units of 18,723 hp., against 63 of 17,993 hp. in March, according to reports received by the Bureau of the Census from 11 leading manufacturers.

Steel Furniture Orders Lower in April

WASHINGTON, June 2.—Orders for steel furniture in the business group totaled $1,436,899 in April compared with $1,521,168 in March, according to reports received by the Bureau of the Census. Orders for shelving furniture were valued at $369,878 against $415,612. In four months, steel furniture orders totaled $6,265,519, a drop of 40 per cent from $10,407,546 in the first four months of 1930.

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Detroit Scrap Market Is Stagnant

DETROIT, June 2.—With practically no buying on the part of consumers, the local scrap market is stagnant. Steel mills are not interested in making purchases unless they can pick up desirable items at low prices. The local steel plant has an ample supply of scrap for several months' operations and, as production is being curtailed, it is not expected to be in the market for some time. Quotations have not changed.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$7.50 to	$8.00
Borings and short turnings	3.75 to	4.25
Long turnings	3.00 to	3.50
No. 1 machinery cast	8.25 to	8.75
Automotive cast	11.00 to	11.50
Hydraul. comp. sheets	6.50 to	7.00
Stove plate	6.25 to	6.50
New No. 1 busheling	6.50 to	7.00
Old No. 2 busheling	2.50 to	3.00
Sheet clippings	4.25 to	4.75
Flashings	6.50 to	7.00

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"Standard Thicknesses, Weights and Tolerances of Sheet Metal (Customary Practice)" is the title of a Bureau of Standards circular "intended to furnish information as to the usual practice of American manufacturers with regard to stock thicknesses or weights of sheets and plates of common metals and alloys, but it does not promulgate these data as standards." Included in this circular are gages or stock lists for sheet metal widely used in Europe, particularly in England, France and Germany, and also in Japan. Information is also given with regard to manufacturing tolerances adopted by the American technical societies, the manufacturers' associations and standardizing bodies, or those tolerances used by leading manufacturers.

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Almost $15,000,000 will be expended in 1931 for highway purposes by Illinois counties. Approximately 510 miles of road and 152 bridges will be constructed. Of the total to be expended, about $9,000,000 will be for concrete or brick pavement.

Electrical Manufacturer Argues for Stabilization of Prices

(*Concluded from page* 1844)

of the elements of cost in such transactions which go to make up final price.

"Under the leadership of President Hoover many commissions and committees are studying the business cycle and endeavoring to prevent violent fluctuations in the business cycle, to flatten out its curves and to minimize the evils of unemployment. Unless the evils of serious business depressions and widespread unemployment, such as we are now having, can be ultimately eliminated from our present capitalistic and individualistic system of business, it will be forced into the discard and some other system introduced which may not be as much to our liking. But all these efforts are directed toward stabilization of employment and of the volume of business and do not touch on the question of price. And yet I think all will acknowledge that we can never attain a normal steady flow of business unless prices show equal stability.

Elimination of Violent Price Fluctuations Is Essential

"The elimination of violent price fluctuations is just as necessary as the elimination of violent fluctuations in the actual volume of business. When prices are rapidly rising, the tendency is toward advance protection and overbuying so as to avoid having to pay a higher price at the time of actual demand; during a period of rapidly falling prices, the placing of requirements is held up as long as possible and minimum requirements only covered, hoping for a lower price in the future. Both mitigate against a steady normal flow of business.

"No one objects to a stabilized price, provided he is satisfied that it is a fair price. A buyer is mainly interested in knowing that he is getting as good a price as any other buyer under similar conditions—that is, that he is not being discriminated against—and that no immediate price reductions may be expected.

"The cutting of a price in nine cases out of ten represents illegal price discrimination, as generally it is either done deliberately by a weak-kneed salesman, or is prompted by misrepresentation as to the competitive situation. The interpretation of the law as to what constitutes price discrimination is becoming clearer every year and is making firm price policies more and more necessary in order to avoid conflict with the laws intended to protect both other competitors and other buyers. Price discrimination was at first viewed as merely unfair to other competitors, but even without the element of competition a recent Supreme Court decision makes it unfair to other buyers who are in competition with each other.

"Quality discrimination—that is, giving one buyer a poorer quality for the same class of goods than some other buyer—has long since been ruled out as an unfair practice in commercial transactions and price discrimination is fast being similarly ruled out entirely aside from any question of its legality.

Price Cutting Creates Demoralized Conditions in Any Industry

"Bargain and barter and price cutting generally promote a demoralized commercial situation in any industry and are inefficient and wasteful both for the buyer and the salesman. Where firm price policies are departed from, such acts are usually prompted by a weak-kneed sales policy on the part of the selling company rather than by sharp, questionable practices on the part of buyers. Its correction therefore rests almost entirely with the competitive group rather than with the buyers.

"When I speak of a stabilized price I do not mean a fixed constant or frozen price. All that I wish to see eliminated are the arbitrary violent price fluctuations which are uneconomic and do not promote the welfare of the buyer when too high and of the seller when too low. Market levels should always reflect fundamental and long-trend changes in costs and competition can always be relied upon to break down any arbitrary unfair price structure.

"Much could also be said of the equities or inequities of reciprocity in commercial transactions. Whether reciprocity is an evil or not, we are all human, we all like to deal with our friends, and in the mad scramble for business any pressure that can be exerted will be used to influence the placing of business. Where some seller has had a fair chance to sell his product and then finds the judgment of plant executives and engineers against him, I consider reciprocity an evil if it is then used to force the sale. Reciprocity should merely give a seller an open door and a fair chance to prove the merits of his proposition.

"Where do trade associations fit into the picture of price stabilization? Self-government on the part of business and any group effort toward stabilization do not mean illegal price agreements. These have always failed even where attempted. In the days of pools and price setups, even before the Sherman anti-trust law, competition and selfishness always crept in, and broke down any effort artificially to enhance prices. The only group effort that is possible is that of education and an appeal to the intelligence and sound business judgment of individual executives.

"The welfare of any competitive group depends absolutely on how sanely each individual executive conducts his own business. Where there is mutual confidence and respect much can be done by education and by the continual stressing of sound business policies. If a follow-the-leader policy and firm price policies are found in any industry, it does not mean illegal group action and can only be properly accomplished by continually stressing the evils of destructive competition and ultimately finding that conditions have improved because of the intelligence and sound business judgment of each executive in the conduct of his individual business.

"Competitive groups had hoped for real assistance from the Federal Trade Commission and, by means of conferences with that commission, developing a law merchant which would prevent and eliminate economically unsound or unfair methods of competition, but unfortunately trade practice rules have been emasculated until they merely represent a restatement of various features in the Federal laws themselves. Self-government and self-restraint on the part of business itself is now our only remedy.

"I will not be a party to illegal price agreements or understandings and always insist on freedom of individual action in respect to prices and in respect to all competitive relations. I will not myself support or maintain any recognized market levels which, from my own cost experience, I find to be too high and unfair to my customers, but if my own cost experience satisfies me that existing market levels are economic, fair and protect all parties at interest, I consider it in the interest of my own business and of the industry in which I am engaged to recognize those market levels and to so direct my own sales policies that price stabilization will be promoted."

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National Metal Congress to Have Many Papers

Sixty-five technical papers are on the tentative program of the annual convention of the American Society for Steel Treating, which will be a feature of the National Metal Congress and Exposition in Boston, Sept. 21 to 25. This is more than a 50 per cent increase over the number presented at the Metal Congress held last fall in Chicago.

Separate sessions devoted to melting, sheet steel and nitriding are on the program, while the metallurgy of cast iron and non-ferrous metals will also be covered. Morning sessions of the Congress will be held at the Hotel Statler. Commonwealth Pier, scene of the National Metal Exposition, will accommodate the afternoon sessions.

Steel Exports Shrink Further, with Imports Higher

WASHINGTON, May 28.—Iron and steels exports in April totaled 101,081 gross tons, a decline of 8431 tons from those in March, the respective average daily movements being 3369 tons and 3615 tons. Among the heavier decreases in April were in steel bars, skelp, tank steel and fabricated material. Gains were made in a number of items, however, including black steel sheets, rails, casing and oil line pipe, cast iron pipe and black galvanized pipe.

In the first four months of 1931 exports aggregated 394,550 tons, a drop of 473,374 tons or 55 per cent from those in the corresponding period of 1930, when they were 867,924 tons.

Imports in April rose 7471 tons to 47,872 tons from 40,401 tons in March. In the first four months of the year, however, they declined 40,155 tons or 20 per cent from 197,254 tons in the like period of last year. The largest gain in April was in pig iron, which rose to 14,479 tons from 7357 tons. Reinforcement bar imports increased to 4934 tons from 3944 tons.

Canada took 53,281 tons or 52.7 per cent of the April exports. Among the larger shipments of finished steel to Canada were plain heavy structural shapes, 8179 tons; steel bars, 2015 tons; black steel sheets, 7995 tons; steel plates, 4566 tons, and steel rails, 2550 tons. Taking only 6451 tons, including 2260 tons of tin plate, Japan was in second position among the countries taking our iron and steel in April.

Of the 4934 tons of reinforcement concrete bars imported in April, 3416 tons came from Belgium, which was the largest source of total incoming shipments, with 13,443 tons. Imports of reinforcement concrete bars from Germany amounted to 1323 tons.

Russia provided 14,590 tons of the 32,919 tons of manganese ore imported, while 14,071 tons came from Brazil and 2860 tons from India. Of the 2253 tons of ferromanganese imported, 1140 tons came from Canada and 910 tons from the United Kingdom.

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American Steel & Wire Co., Chicago, has issued Bulletin No. 3, comprehensively outlining the adaptability of cold-rolled strip steel to nearly every purpose of drawing, stamping or rolling. The booklet interestingly illustrates many products made of cold-rolled strip steel, including automobile parts, office and household furniture and utilities, hardware fixtures, chains, toys, etc.

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Exports of Iron and Steel from the United States

(In Gross Tons)

	April		Four Months Ended April	
	1931	1930	1931	1930
Pig iron	286	1,327	1,635	7,099
Ferromanganese	1	1,348	14	2,951
Scrap	15,622	48,494	52,652	204,385
Pig iron, ferroalloys, and scrap	*15,909*	*51,169*	*54,301*	*214,435*
Ingots, blooms, billets, sheet bar	218	2,316	1,783	10,767
Skelp	3,603	5,399	23,822	32,234
Wire rods	3,239	4,299	13,444	16,837
Semi-finished steel	*7,060*	*12,014*	*39,049*	*59,838*
Steel bars	3,897	11,424	18,833	41,142
Alloy steel bars	291	740	1,945	3,364
Iron bars	87	77	339	581
Plates, iron and steel	5,112	12,150	19,032	46,691
Sheets, galvanized steel	4,435	7,477	16,495	37,346
Sheets, galvanized iron	333	372	2,487	2,174
Sheets, black steel	10,904	12,127	34,015	50,988
Sheets, black iron	1,032	858	2,703	4,249
Hoops, bands, strip steel	3,148	3,824	14,171	18,603
Tin plate; terne plate	8,798	22,525	31,852	92,204
Structural shapes, plain material	9,066	12,665	38,354	58,814
Structural material, fabricated	4,459	6,897	17,424	39,305
Tanks, steel	1,266	1,328	7,234	6,097
Steel rails	4,117	13,704	14,238	34,883
Rail fastenings, switches, frogs, etc.	689	1,957	2,737	6,780
Boiler tubes	998	2,362	3,191	7,167
Casing and oil line pipe	2,297	6,944	10,338	30,592
Pipe, black and galvanized welded steel	4,020	7,085	15,811	31,782
Pipe, black and galvanized, welded iron	375	1,090	1,850	7,084
Plain wire	1,482	3,341	5,253	11,039
Barbed wire and woven wire fencing	2,639	4,763	9,748	13,399
Wire cloth and screening	84	102	681	552
Wire rope	279	468	1,075	1,743
Wire nails	810	666	3,019	2,568
Other nails and tacks	362	570	1,418	2,233
Horseshoes	3	3	11	49
Bolts, nuts, rivets and washers, except track	576	908	2,034	4,252
Rolled and finished steel	*71,559*	*136,427*	*276,288*	*555,681*
Cast iron pipe and fittings	3,170	2,036	10,049	12,901
Malleable iron screwed fittings	487	889	2,244	4,445
Car wheels and axles	716	1,183	2,831	4,636
Iron castings	464	644	2,001	2,772
Steel castings	189	2,123	1,790	4,464
Forgings	717	761	3,198	3,514
Castings and forgings	*5,743*	*7,636*	*22,113*	*32,732*
All other	810	1,358	2,799	5,238
Total	101,081	208,604	394,550	867,924

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	April		Four Months Ended April	
	1931	1930	1931	1930
Pig iron	14,479	12,183	36,433	41,660
Sponge iron	1		209	
Ferromanganese and spiegeleisen*	2,253	6,168	10,555	23,494
Ferrochrome†	35	....	56	87
Ferrosilicon‡	77	846	450	2,408
Other ferroalloys	201	....	610	....
Scrap	1,333	1,770	4,810	10,030
Pig iron, ferroalloys and scrap	*18,379*	*20,967*	*53,123*	*77,679*
Steel ingots, blooms, billets, etc.	1,904	1,347	8,423	6,351
Wire rods	655	1,019	2,732	4,433
Semi-finished steel	*2,559*	*2,366*	*11,155*	*10,784*
Concrete reinforcement bars	4,934	4,168	14,925	13,331
Hollow bar and drill steel	142		474	
Merchant steel bars	4,554		17,406	
Iron bars	88	213	304	624
Iron slabs	21		21	
Boiler and other plate	61	1	624	1,329
Sheets, skelp and saw plate	1,541	3,962	7,157	10,883
Tin plate	11	18	48	46
Structural shapes	6,538	15,122	24,596	54,556
Sheet piling	366		456	
Rails and rail fastenings	2,544	428	3,406	1,846
Welded pipe	402	382	2,063	1,749
Other pipe	805	1,043	4,535	6,169
Barbed wire	499	443	2,033	1,827
Round iron and steel wire	265	487	1,023	1,694
Flat wire and strip steel	62	114	234	555
Wire rope and strand	209	311	701	988
Other wire	63	19	292	159
Hoops and bands	1,921	2,394	6,569	6,554
Nails, tacks and staples	508	322	2,393	1,635
Bolts, nuts and rivets	46	58	446	155
Other finished steel	1	....	22	1
Rolled and finished steel	*25,582*	*29,486*	*89,728*	*104,101*
Cast iron pipe and fittings	1,160	645	2,477	4,012
Castings and forgings	192	222	616	678
Total	47,872	53,686	157,099	197,254
Manganese ore*	32,919	26,700	61,653	117,434
Iron ore	162,652	313,069	576,138	1,110,384
Magnesite (dead burned)	1,692	81	8,136	12,870

*Manganese content only.
†Chromium content only.
‡Silicon content only.

Larger British Steel Mills Operating At 25 Per Cent of Capacity

(*By Cable*)

LONDON, ENGLAND, June 1.

THE Central Board of the Shipbuilding Employers' Federation has petitioned the Steel Makers' Association for a reduction in steel prices, pointing out that the present disparity is greatly handicapping British shipyards in competing with foreign builders. Clyde output in May was six vessels of 31,500 tons.

The National Shipbuilders' Security Association is negotiating to purchase certain Northeast Coast shipyards, including one which has never been operated.

A new can-making plant has been opened at Perry Wood in Worcester by the Metal Box Co. The new works will have a capacity of 100,000,000 cans annually.

A new sheet mill has been placed in operation by the Motherwell Iron & Steel Co., which will roll from 3/16 in. to No. 18 gage sheets, 55 in. wide and 16 ft. long.

In the Department of Scientific Industrial Research, the springs committee has determined that unpolished steel springs have 20 to 50 per cent less strength than springs which have been machined and polished. The difference was found to be caused by variation in surface conditions from decarburization during heat treatment. Further investigation is being made by the committee.

At a meeting of debenture bondholders of Pease Partners, Ltd., at which a plan for a three year and six months' moratorium was approved, Sir Gilbert Garnsey stated that complete financial reconstruction of the company is inevitable and merger with other interests will be carefully considered.

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British shipyards petition steel makers for lower priced material to meet foreign competition.

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New German battle cruiser has Diesel engines weighing 8 kg. per hp. and developing 50,000 hp.

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Wage reductions have been made by European steel plants, except in France.

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Corrosion investigation committee formed jointly by German associations.

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Japanese expected to secure Egyptian and South African rail contracts.

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The general market situation here is unchanged. Pig iron consumers are seeking reductions in the price of Cleveland iron, but makers still refuse concessions. The market for hematite iron is less active and £3 5s. ($15.80) per ton has been shaded when substantial tonnages were offered.

Steel demand is at a low level and certain of the larger mills are operating at about 25 per cent of capacity. The Continental steel market is lacking in strength with tonnages on mill order books being rapidly depleted. Consumers of foreign steel here are not interested in buying, even at concessions, as they are unable to dispose of their own finished products.

Tin plate is quiet and quotations have declined to 14s. ($3.40) per base box, f.o.b. works port, on desirable business. The general quotation, however, is 14s. 3d. ($3.46) per base box, and as much as 14s. 9d. ($3.58) is paid in special instances. The best feature of the present market is Continental demand with small inquiries from Canadian and South African consumers.

Interest in galvanized sheets has improved slightly, but mills are still seeking large orders. No. 24 gage corrugated sheets in bundles have sold at £10 2s. 6d. per ton (2.19c. per lb.), f.o.b., but £10 per ton (2.17c. per lb.) is believed to be acceptable today.

The Continental Steel Cartel will meet June 11, to continue discussion of renewing the agreement, and it is suggested that at the meeting scheduled for June 30 a contract may be ready for the signature of all parties. On June 30, also, the Continental Wire Rod Cartel will meet for discussion of general business, especially the proposed International Wire Syndicate, a meeting for the formation of which has been scheduled for early in July.

Czechoslovakian mills have booked Soviet orders for 6,000,000 rubles of wire, pipe, boiler installations and rails.

The Alpin Montan Gesellschaft in Austria has only one Donawitz furnace in blast and the proposed blowing in of the Eisenerz furnaces has been postponed indefinitely. Dissolution of the Viennese Iron Merchants'

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at $4.8665 (par)

British Prices, f.o.b. United Kingdom Ports

Ferromanganese, export.	£8	5s.	to	£9	0s.	$40.10	to	$43.74
Billets, open-hearth	5	0	to	5	7½	24.30	to	26.12
Black sheets, Japanese specifications	10	5				49.82		
Tin plate, per base box	0	14¼	to	0	14¾	3.46	to	3.58
						Cents a Lb.		
Steel bars, open-hearth	7	17½	to	8	7½	1.71	to	1.81
Beams, open-hearth	7	7½	to	7	17½	1.69	to	1.71
Channels, open-hearth	7	12½	to	8	2½	1.66	to	1.76
Angles, open-hearth	7	7½	to	7	17½	1.69	to	1.71
Black sheets, No. 24 gage	8	10				1.84		
Galvanized sheets, No. 24 gage	10	2½				2.19		

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	7s.	to	£2	9s.	$11.42	to	$11.90
Billets, Thomas (nominal)	£3	3s.	to	£3	4s.	$15.31	to	$15.55
Wire rods, low C., No. 5 B.W.G.	5	0	to	5	5½	24.30	to	25.64
Rails, light	6	0				29.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12	54.68	to	58.32
						Cents a Lb.		
Steel bars, merchant	3	11	to	3	12	0.77	to	0.78
Beams, Thomas, British standard (nominal)	3	7	to	3	8	0.75	to	0.76
Channels, Thomas, American sections	5	12	to	5	14	1.24	to	1.26
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	3	9	to	3	10	0.77	to	0.78
Angles, Thomas, 3-in.	3	11	to	3	12	0.77	to	0.78
Hoops and strip steel over 6-in. base	4	4	to	4	5	0.91	to	0.93
Wire, plain, No. 8 gage	4	18½				1.08		
Wire, barbed, 4-pt. No. 12 B.W.G.	8	12½				1.90		

Syndicate has been arranged for Sept. 30.

German production in April was 528,000 tons of rolled steel products. Belgian output in April was 257,000 tons of pig iron, 245,000 tons of raw steel, and 200,000 tons of rolled steel.

Production in Luxemburg in April was 171,000 tons of pig iron, with 24 furnaces in blast at the end of the month. The Acieries Reunie de Burbach-Eich-Dudelange has blown out one furnace at Burbach. Raw steel output of Luxemburg in April was 166,000 tons.

The Saar production in April was 136,900 tons of pig iron, 142,000 tons of raw steel and 96,000 tons of rolled steel. Czechoslovakian output was 98,000 tons of pig iron and 136,000 tons of raw steel.

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Soviet Orders in Germany Total $24,000,000

HAMBURG, GERMANY, May 25.—Orders are beginning to be received by German machinery makers on contracts closed with the Soviet last month. Purchases thus far have been about $24,000,000 and further contracts for $5,000,000 to $6,000,000 are expected in the next few weeks. Of the total machinery orders already placed about $9,000,000 worth was agricultural equipment.

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Only 6,800,000 German Workers on Full Time

DUSSELDORF, GERMANY, May 23.—At the end of April there were 20,800,000 employable workmen in Germany, of whom 6,800,000 were employed full time, 9,300,000 were working from 20 to 30 hr. a week, and 4,700,000 were collecting unemployment benefits.

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Germany Has Had Many Periods of Depression

BERLIN, GERMANY, May 25.—At the recent opening of the Building Exposition here, Dr. Reichert of the Federation of German Iron and Steel Industrials pointed out that the present depression in the German steel industry is not without parallel in the past. Depressions, he said, have always been followed by a far greater output than prior to the depression.

From 1873 to 1879, production was 48 per cent lower than in 1871 and 1872. In the depression of 1885 to 1886 output was reduced by only 16 per cent, in 1890 to 1891 it declined 18 per cent, but in 1900 to 1901 depression brought a decline of 63 per cent in production. In 1907 to 1908 production fell 15 per cent, and in 1925 to 1926 it was off 23 per cent. The decline in 1930 to 1931 has been 47 to 48 per cent from the 1929 level of production.

Based on improvement in the past following a depression, and the fact that new uses for steel are being developed today, as in the past, Dr. Reichert suggested that the increased production following periods of depression is likely to be repeated soon.

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Fruit Growers Here Use German Nails

HAMBURG, GERMANY, May 25.—Sellers of wire nails have been booking some substantial business from consumers in the United States in recent months, considerably in excess of sales in the same period of 1930. While nail exports to the United States formerly consisted largely of long, thick building nails, recent business has been chiefly in B. W. G. 13 x 1¼ in., and other small nails, used principally for making cases and crates by the fruit growers of California and Washington. Sellers state that the difference in price between German and American quotations for this class of nails is greater than in the heavier building nails.

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Wage Cuts General in European Plants

HAMBURG, GERMANY, May 25.—Wages of workers in iron and steel plants of Europe have been rather generally reduced in recent months. In the Polish steel industry a reduction of 5 per cent has been made, and cuts of 5 to 7 per cent have been introduced in Sweden, Hungary and Austria. Negotiations for wage reductions have been instituted in Italy, Norway and the Netherlands. France is the only country in which wage reductions have not been made or are imminent. This is partly accounted for by the fact that the French wage level in the past has been on a slightly lower scale than in the rest of Europe.

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Form Committee to Study Corrosion

HAMBURG, GERMANY, May 25.—A corrosion investigation committee has been formed jointly by various German associations, including the Federation of German Chemists, Federation of Iron and Steel Manufacturers and the mechanical engineers. The committee will serve as an exchange organization for experiments and experiences of members in corrosion of iron, steel and non-ferrous metals, and will exchange information with foreign organizations.

Foreign Rail Business May Go to Japan

HAMBURG, GERMANY, May 25.—Following the report that three leading Japanese trading companies have reached an agreement for division of the Far Eastern market, European steel producers are renewing their efforts to obtain agreements with the trading companies to handle their products. Previously, competition among the Japanese companies made such agreements impossible.

At present European rail mills are concerned over the prospect of the Government Works in Japan being awarded 5500 tons of rails in Egypt and 41,000 tons in South Africa. The Japanese maker has submitted bids 10s. to 12s. 6d. ($2.43 to $3.04) per ton under those of the International Rail Makers' Association, which has previously received these tonnages. It seems to be generally believed that the South African rails will be placed in Japan in an effort to break the present European price schedule, as rail quotations are about 5 per cent higher than three years ago, while the average steel export prices from European mills are about 30 per cent lower.

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Sponge Iron Plant at Bochum Suspends

DUSSELDORF, GERMANY, May 23.—The Eisenschwamm G.m.b.H., at Bochum, controlled by the Friedrich Krupp A. G., Vereingte Stahlwerke A. G. and the German Dyestuffs Corpn., has been closed for an indefinite period. The plant had operated for some months producing high-grade steel directly from sponge iron by the Norskstaal process, a Norwegian patent. In suspending operations, it is stated that results have been fully up to expectations and that operation will be resumed when demand has improved. Meanwhile, it is understood that, while production costs at the plant have actually proved to be low, certain improvements in method are planned and the inventor of the process is expected to take charge of experimental work, which will be conducted at Bochum over the next eight months or more.

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Steel Founders' Society of America, Inc., has announced that its meeting, scheduled for French Lick Springs Hotel, French Lick, Ind., June 17, 18 and 19, has been canceled. A special meeting of the society's board of directors will be held at Hollenden Hotel, Cleveland, on June 11.

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Babcock & Wilcox Co., New York, has acquired non-exclusive license to utilize the patents of the Automatic Arc Welding Co., 11 West Forty-second Street, New York, automatic arc welding equipment.

Machine Tool Trade Marking Time

Sales and Inquiries at Low Ebb, with Immediate Outlook Not Encouraging

MANUFACTURERS of machine tool and other shop equipment are marking time until some general uptrend in the metal-working industries is in evidence. So many prospective buyers of equipment have postponed action until there are definite signs of business recovery that the machine tool trade can scarcely look for improvement in orders in the immediate future.

May business fell below that of April with most sellers, and the outlook for June is not encouraging. The tendency of machine tool business is to slow down in the summer months, and the additional retarding influence of depressed conditions in most lines of industry will accentuate this seasonal dullness.

Chicago appears to be the brightest spot on the machine tool map at the moment, but a good deal of the prospective business springs from public sources and the railroads. The State of Illinois has issued an inquiry for 11 machine tools, and the public schools of Chicago are buying a few tools. The Santa Fe Railroad continues to place orders, and there is a report that the Great Northern will soon issue a fair-sized inquiry. The War Department has taken bids on 15 machines for Dayton, Ohio, but it may be a week or two before awards are made.

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NEW YORK

The week has brought no signs of encouragement to the local machine tool trade. May business fell considerably below that of April with most sellers of shop equipment, and the prospects at hand are so few that June probably will be as dull as last month. With the summer season so close at hand, the trade expects that it will be obliged to mark time until some general uptrend in the metal-working industries is in evidence.

NEW ENGLAND

Some local machine tool dealers did a fair business the past week. This suggestion of life has raised hopes that orders in June will further improve, although a large majority of buyers, who contemplated purchasing equipment, have indefinitely postponed buying. New England makers of machine tools, if anything, are less active than a week ago.

MILWAUKEE

Sales of machine tools dropped as the month came to a close and it is not likely that any shop will show an increase in volume during May, compared with April. While trade last week was rather disappointing, tool builders are not pessimistic with respect to future orders, although none expects much more than a continuance of the drifting state of business during the summer. Fresh inquiry is of exceedingly moderate proportions and comes from less diversified sources than a month ago, the automotive industries being especially less conspicuous.

CLEVELAND

Quite a few machinery users who have been considering buying new equipment have tightened up on purchases and advised the trade that for the present they will not consider ordering any new tools. There is very little new inquiry and little business is expected during the summer. May sales fell below those in April. The War Department Air Corps, Dayton, Ohio, has taken bids against its recent lists for about 15 machines, but it may be a week or two before the orders are placed.

CINCINNATI

A slight improvement in bookings of small lathes was noted the last week. These orders were all for single tools and came from widely scattered sources. Production of local plants continues at about 35 to 40 per cent of capacity. Inquiry is diminishing, and manufacturers are not anticipating much activity even from those seeking quotations.

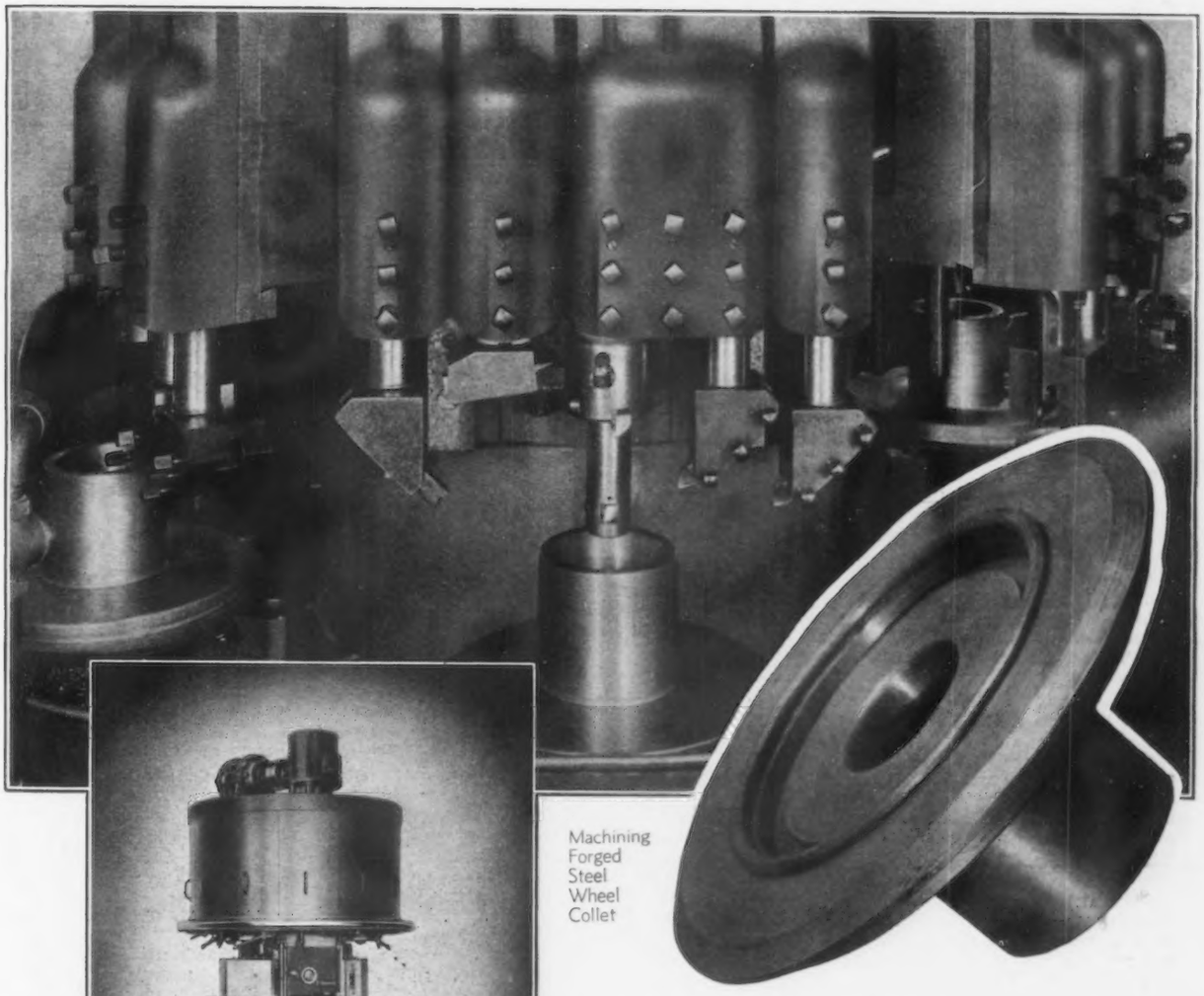
CHICAGO

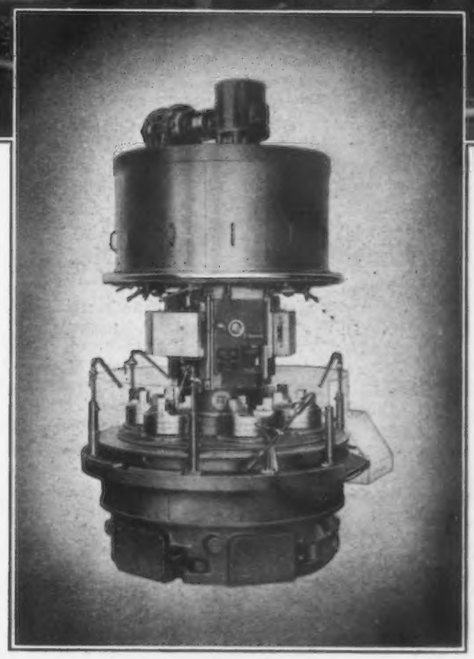
The local machine tool market appears to have a better undertone. There are persistent reports that the Great Northern has a list in preparation and the Santa Fe continues to place the remaining needs of its spring requirements. The general repair shop for the Chicago public schools is inquiring for a 36-in. x 10-ft. lathe and the State of Illinois is in the market for 11 machine tools and numerous accessories.

On the whole, inquiries are more numerous, but dealers generally feel that the bulk of sales effort in the next few months will have to be directed at inquiries that have been at hand for some time.

State of Illinois list follows: one 13-in. x 5-ft. lathe, one 9¼-in. x 3-ft. precision lathe, one 20-in. shaper, one No. 2 miller, one ⅜-in. drill, one 6-in. bench grinder, one 10-in. floor grinder, one No. 3 arbor press, one power hack saw, one 20-in. drill press, one bench drill press.

THE BULLARD METHOD





Machining Forged Steel Wheel Collet

WHERE manufacturing demands the short runs of job lots, the Mult-Au-Matic Method offers Individual Type Tool Holders for variety work with quick change-over. These Holders have the rigidity of block type and yet permit machining similar work in varying sizes. . . . . Ask for estimates using Individual Type Tool Holders on your work.

THE BULLARD COMPANY
Bridgeport **Connecticut**

New York

BOARD of Education, Park Avenue and Fifty-ninth Street, New York, has approved plans for new Staten Island Vocational and Continuation School at St. George, to cost $1,000,000 with equipment. Present manual training school at 67 Houseman Avenue, Port Richmond, will be removed to new location. William C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board.

Fruehauf Trailer Co., 10940 Harper Avenue, Detroit, manufacturer of motor truck trailers, parts, etc., has leased building at Skillman Avenue and Rawson Street, Long Island City, for Eastern factory branch, service and distributing plant.

Globe Brass Foundry & Pattern Corpn., Brooklyn, recently organized by Anton Korwan, 25-64 Thirty-first Avenue, Long Island City, and associates, with capital of $10,000, plans operation of local foundry and metal-working plant.

American Maize-Products Co., 100 East Forty-second Street, New York, has purchased 70-acre tract at South Gate, Los Angeles, and contemplates new Pacific Coast plant for production of corn oil, corn sugar and other corn derivatives, to cost over $1,000,000 with machinery.

United States Engineer Office, Army Building, 39 Whitehall Street, New York, will receive bids until June 23 for one 50-ft. steel hull motor-driven tug for New York Harbor.

Triplex Oil Co., Long Island City, has purchased 45,000 sq. ft. near Review Avenue, as site for new bulk storage and distributing plant, to cost over $50,000 with equipment.

Superintendent of Lighthouses, Staten Island, N. Y., is asking bids until June 12 for one 45-ft. buoy boat, 11 ft. 6 in. beam, with gasoline propelling machine.

Allegheny Steel & Brass Corpn., Brooklyn, has been organized with capital of $20,000 to take over and expand company of same name with foundry at 308 Hewes Street. Joseph Barmak is one of incorporators.

Durant Motor Co., Lansing, Mich., has leased lower floor of its former eastern assembling plant at Elizabeth, N. J., sold several months ago to Bayway Terminal Co., Elizabeth, and will occupy for factory branch, service and distributing plant. William C. Durant, head of company, has sold six-story factory at 143-51 Bay Street, Jersey City, N. J., to Provost Realty Co., Jersey City.

National Public Service Corpn., 57 William Street, New York, operating Jersey Central Power & Light Co., Dover, N. J., and vicinity, and other light and power properties, has arranged for purchase of Eastern New Jersey Power Co., Asbury Park, N. J., and will consolidate with Jersey Central interests. Transmission line will be built for a connection at Sayreville, N. J., and recently completed plant of Jersey Central company at that place will be tied-in with generating station of Eastern New Jersey company at South Amboy, N. J. Purchasing company is arranging for a security issue for expansion and other purposes.

Board of Education, Washington, N. J., contemplates installation of manual training equipment in new two-story and basement high school to cost about $150,000, for which revised plans are being drawn by Charles Granville Jones, 280 Broadway, New York, architect.

Bart Reflector Co., 375 Verona Avenue, Newark, Blasius Bart, head, manufacturer of reflectors, metal projectors, etc., has leased one-story building at 35-39 Grafton Avenue, for new plant.

Dorr Co., Inc., New York, and Oliver United Filters, Inc., San Francisco, manufacturers of filtration equipment, have been merged and new organization will be known as Dorr-Oliver Corpn. Each company will function as a separate unit and will be headed by John Van Nostrand Dorr and Edwin L. Oliver respectively.

A. & R. Iron Works, Inc., and the Removable Steel Bodies Co., Inc., have merged as the Ario & Rosman Metal Body Corpn., 426 Dewitt Avenue, Brooklyn, for the manufacture of steel and aluminum bodies and containers, roll-off equipment and commercial metal products.

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South Atlantic

CITY Council, Centerville, Md., has disposed of a bond issue of $70,000, fund to be used for extensions and improvements in municipal electric light and power plant, including additional equipment.

Conowingo Electric Co., Elkton, Md., has been organized to consolidate Conowingo Electric Power Co., operating in Hartford County, and Northern Maryland Power Co., with properties in Cecil County. Consolidated organization plans expansion and improvements, including transmission lines.

Crown Cork & Seal Co., Inc., Eastern Avenue and Kresson Street, Baltimore, manufacturer of metal bottle caps, bottle capping machinery and kindred equipment, has purchased Detroit Gasket Mfg. Co., 1579 East Milwaukee Street, Detroit, manufacturer of non-metallic gaskets and similar engineering specialties. Purchasing company will continue operation of Detroit company as a subsidiary and plans to develop facilities there for its other products.

Pine Forest Products Co., Inc., Suffolk, Va., is considering erection of new one-story band saw mill, with electric-operated equipment, to cost over $70,000 with machinery. A new timber-treating plant is also proposed. J. Eugene McKelvey is president.

Robey-Lambert Airplane Co., Riverdale, Md., operating with capital of $50,000, has arranged for change of company name to Robey-Lambert Diesel Engine Co., and proposes to concentrate largely on Diesel engines and parts in future. Company is headed by Albert G. Bauer and Albert S. Roebuck.

City Council, Martinsville, Va., has

plans for extensions and improvements in municipal electric light and power plant, including additional equipment, to cost over $125,000.

Collins Flashlight Corpn. of Virginia, Inc., Fredericksburg, Va., care of C. B. Collins, Fredericksburg, recently organized by Mr. Collins and associates, has plans for new one-story factory, with two L-extensions, for manufacture of electric flashlight equipment and kindred products. Initial unit will cost over $35,000 with machinery. Troy Alexander, of Civic Utilities Corpn., 522 Fifth Avenue, New York, is interested in new company and will be an official.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids (no closing date stated) for one 300-ft. steel tower for radio service at navy yard at Charleston, S. C., also bids (no closing date stated) for reerection, extensions and improvements in dirigible hangar at Lakehurst, N. J.

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Philadelphia

IN connection with its electrification program, Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has surveys under way between Trenton and New Brunswick, N. J., and from Wilmington, Del., to Washington, and will soon begin installation of steel poles, power substations, feeder lines and other equipment. It is estimated that 68,000 tons of structural steel and about 39,000,000 lb. of copper and bronze, for wires, etc., will be required to complete project from Manhattan Transfer to Washington.

Reading Co., Reading Terminal, Philadelphia, has plans for a one-story line maintenance building with service and repair departments, and garage unit for company trucks and cars at Wayne Junction, to cost over $90,000 with equipment. Clark, Dillenback, address noted, is company engineer.

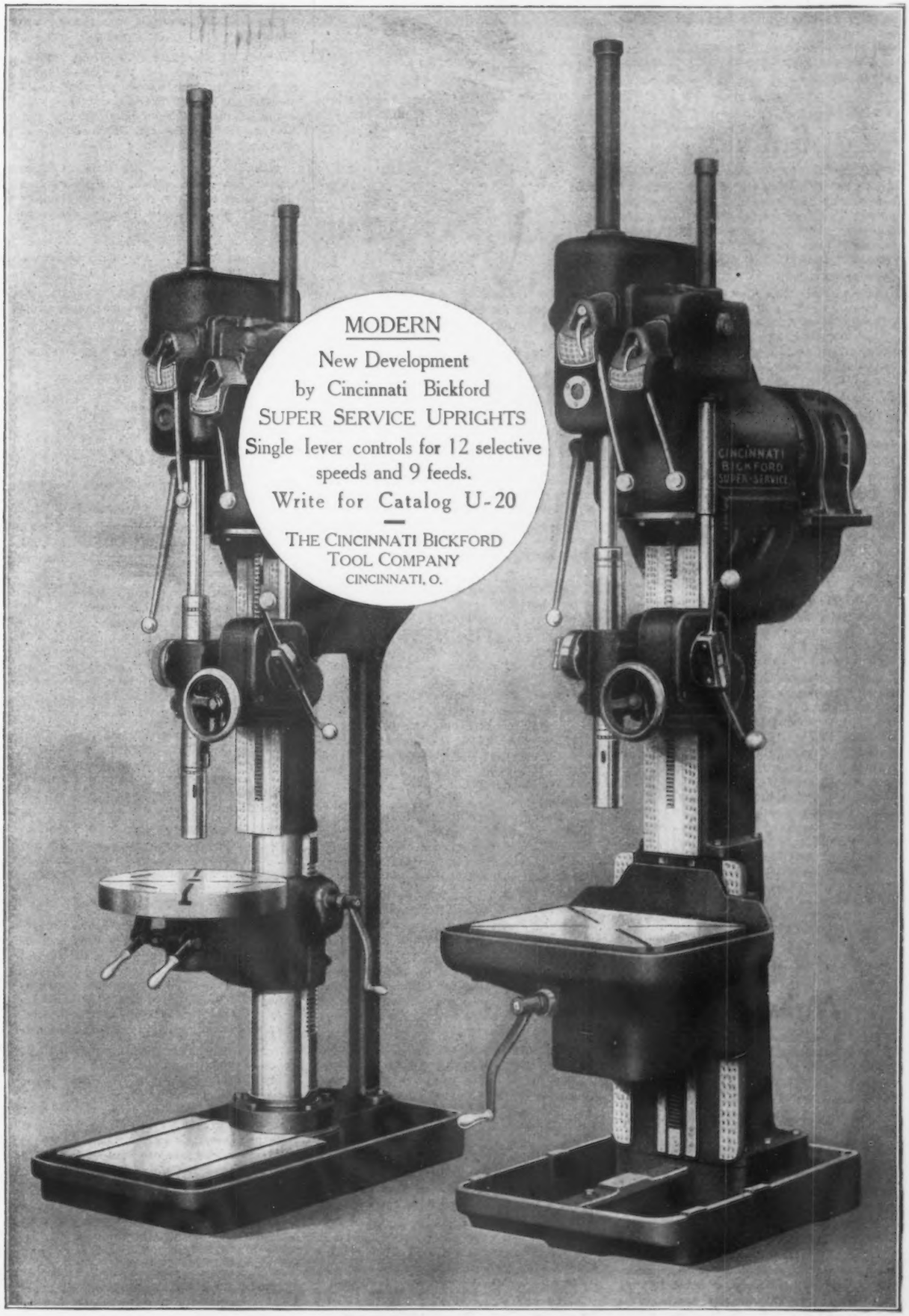
Board of Public Education, Keystone Building, Philadelphia, has purchased property at Malvern and Graham Streets as site for new junior high school, for which plans will soon be drawn. Unit will include a manual training department and will cost over $500,000. Edward Merchant is secretary and business manager.

Custom Casting Co., Easton, Pa., recently organized by Harrison C. Colket, Bryn Mawr, Pa., and associates, plans operation of local foundry for production of iron and other metal castings. Lippincott Colket, Haverford, Pa., will be an official of new company.

Eastern Cabinet Co., Trenton, N. J., care of Fred J. Kroesen, industrial secretary, Trenton Chamber of Commerce, Stacy-Trent Hotel, recently organized, has leased building previously forming part of plant of Mercer Motors Co., and will remodel for manufacture of cabinets and kindred products. Unit provides about 50,000 sq. ft. floor space. Automatic machinery will be installed.

E. J. Quigley, State purchasing agent, State House, Trenton, N. J., is asking bids until June 12 for blanking-embossing dies for road markers, also for one concrete mixer; until June 8 for mechanical laundry equipment.

Board of Education, Downington, Pa., contemplates installation of manual training department in new two-story and basement high school to cost about $175,000, for which plans are being drawn by J. H. Mowers, Phoenixville, Pa., architect.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New Development
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SUPER SERVICE UPRIGHTS
Single lever controls for 12 selective speeds and 9 feeds.
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THE CINCINNATI BICKFORD TOOL COMPANY
CINCINNATI, O.
CINCINNATI BICKFORD SUPER-SERVICE

Board of Education, Hamilton Township, Hamilton High School, South Clinton and Park Avenues, Trenton, N. J., will receive bids until June 10 for school supplies for year 1931-32. W. A. Robinson is clerk.

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Buffalo

PLANS are being considered by Ford Motor Co., Highland Park, Mich., for new assembling plant at Buffalo, supplementing present works at that place, to cost over $600,000 including equipment. Company has contracted with Buffalo General Electric Co., for initial power requirements.

Samuel Roth, 315 East Raynor Avenue, Syracuse, N. Y., and associates have organized Roth Brothers Metal Co., and plan operation of local metal works. Philip Roth, 105 Crawford Avenue, will be an official of company.

New Process Gear Co., 500 Plum Street, Syracuse, N. Y., has perfected a new type of free-wheeling unit for installation in automobiles, and is planning to devote department of plant to this new line of output. It is expected to be ready for quantity output in about a month.

Allegheny Refineries, Inc., Bolivar, N. Y., is being organized by Wallace E. Sawyer, Bolivar, and associates with capital of $500,000, to erect a local oil refinery, for which site is being selected. Initial unit will cost close to $200,000 with machinery. Mr. Sawyer will be president of new company.

Board of Village Trustees, Mayville, N. Y., is arranging a bond issue of $30,000 for extensions and improvements in municipal electric light and power system.

Curtiss Aeroplane & Motor Co., Inc., Buffalo, is increasing capacity at plant at Kenmore and Vulcan Streets, following recent orders for Government planes, and working force of about 800 men is engaged, exclusive of engineering, experimental and office staff operatives. Improvements are being made in plant for larger production facilities; a large wind tunnel has been installed for experimental tests, and plans are completed for a new landing field near factory. Company has recently removed its experimental division from Garden City, L. I., to local plant and will expand this department. Government order has just been received for 10 observation airplanes with spare parts, totaling $167,463.

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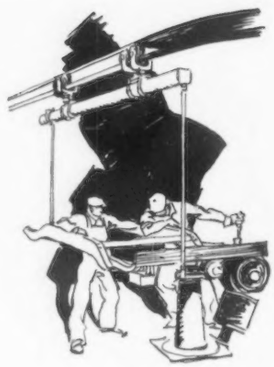
Milwaukee

PLANT of Valerius Corpn., Jefferson, Wis., manufacturer of soda fountains, refrigerating equipment, etc., sustained loss of about $75,000 by fire May 24. Main building, 80 x 240 ft., was destroyed. Intention is to rebuild, but decision awaits adjustment of insurance.

Geuder, Paeschke & Frey Co., 38 Fifteenth Street, Milwaukee, manufacturer of metal stampings and enameled ware, has placed contract with Meredith Brothers Co., 121 East Washington Street, for a factory extension, 60 x 138 ft., one-story and part basement.

J. W. Wells Lumber Co., Menominee, Mich., is placing contracts for reconstruction of several buildings wrecked by fire April 13. Plans call for new maple flooring mill, 80 x 175 ft., 22 ft. high; ware-



house and handling plant, 100 x 150 ft., and new battery of dry kilns.

Board of Vocational Education, Manitowoc, Wis., expects to advertise for bids June 25 for erection of new vocational school, 80 x 320 ft., with wing, 52 x 100 ft., both two stories and basement. Plans are being completed by W. J. Raeuber, local architect. Otto H. Senglaud is president of board.

Monarch Iron Range Co., Beaver Dam, Wis., manufacturer of malleable kitchen ranges, has instituted regular production of an electrical refrigerator which it has had in development several years. Present facilities will not require extensive enlargement for present.

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Chicago

BOARD of Education, Winnetka, Ill., plans installation of manual training department in four-story addition to high school to cost over $750,000, for which general contract has been let to J. W. Snyder & Co., 307 North Michigan Avenue, Chicago. Armstrong, Furst & Tilton, 125 West Madison Avenue, Chicago, are architects.

Abernathy Vise & Tool Co., Chicago, has been organized to take over and expand company of same name, with shop at 2814 West Twenty-sixth Street. Officials of new company include John T. and Joseph C. Christiansen.

Skelly Oil Co., Plymouth Building, Minneapolis, Minn., has plans for installation of a gas plant and system at Montevideo, Minn., to cost over $90,000, for which franchise was recently secured.

Common Council, Lenox, Iowa, is considering installation of a municipal electric light and power plant. Estimates of cost are being made. L. B. Carruthers is city clerk, in charge.

Perry H. Canfield, Waterloo, Iowa, care of Earl Magee, Dunkerton, Iowa, contractor, will erect a one-story hangar on airport near Cedar Bend, Iowa, with repair department, to cost about $30,000 with equipment.

Minneapolis Elevator Repair & Supply Co., 19 High Street, Minneapolis, Minn., has leased property at 531 North Lyndale Street and will remove to that location where plant facilities will be increased.

Texota Service Co., 621 Banniff Building, Oklahoma City, Okla., has secured a franchise for gas service at Little Falls, Minn., and contemplates installation of plant and system to cost over $160,000.

Madison Plating Works, 1146 Madison Street, Oak Park, Ill., recently organized, plans operation of a metal-plating plant. James Madden and G. D. Beckley are heads.

Board of Education, Marshall, Minn., plans installation of manual training equipment in new two-story and basement high school to cost $200,000, for which plans will be drawn by Croft & Boerner, 1004 Marquette Avenue, Minneapolis, architects.

State Department of Institutions, State Capitol, St. Paul, Minn., has authorized plans for a one-story addition to foundry at State prison at Stillwater, Minn., to cost about $35,000. Bids will be asked early in summer. Ellerbe & Co., Minnesota Building, St. Paul, are architects and engineers.

Samuel Olson & Co., 1234 North Kostner Avenue, Chicago, manufacturers of elevating, conveying and other material-handling equipment, have arranged for increase in capital from $150,000 to $250,000 for expansion.

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Detroit

PLANS are being considered by Deerfield Oil Producing Co., Deerfield, Mich., recently reorganized, for a new bulk storage and distributing plant, with pipe line extensions, to cost over $45,000 with equipment. C. P. Curtis is vice-president and general manager.

Heath Aircraft Corpn., Niles, Mich., formerly located on Sedgwick Avenue, Chicago, has begun production in a new plant at Niles, where manufacture will be concentrated in future for single-seat airplanes and other aircraft, including parts and assembling. It is proposed to increase present working force within a month to about 75 persons.

Metalclad Products, Inc., 1450 Buhl Building, Detroit, recently organized with capital of $10,000, plans operation of local factory for manufacture of metal goods. Company is headed by D. S. Richards and R. A. Haigh.

Darling & Co., 4201 South Ashland Avenue, Chicago, manufacturers of fertilizer products, have taken over plant of American Agricultural Chemical Co., Oakwood district, Detroit, for manufacture of commercial fertilizers.

Melvin E. Shetler, 509 Stone Street, Flint, Mich., and associates have organized Reynolds-Shetler Co., with capital of $100,000, and plan operation of factory for production of pumping machinery, including parts and assembling. George J. Shaffer, 5415 Second Boulevard, Detroit, is interested in new company.

Acme Chair Co., Reading, Mich., has acquired plant and business of Wark-Beacon Steel Furniture Co., 1701 West Twenty-second Street, Chicago, manufacturer of steel folding chairs, tables and kindred furniture, and will consolidate. It is proposed to remove works to Reading, where expansion will be carried out for new division.

Detroit Public Lighting Commission, Detroit, has plans for two new power substations, to cost close to $100,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects and engineers.

Antrim Iron Co., Mancelona, Mich., is in the market for a second-hand Corliss engine, 18 x 42 in.

Help for the Man Faced with the Problem of Making a Better Product at Lower Cost . . . . . .

When you read THE IRON AGE each week, be sure to go through the advertising pages, for there you will find ideas that will cut your costs and increase the salability of your product.

A FEW IDEAS FROM THE ADVERTISING PAGES IN THIS ISSUE:

New High Speed Automatic Lathe (12-in. Swing)

Possesses new tooling possibilities.

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Die castings are likewise available in other copper-base alloys.

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Heat-treated parts for a railroad application have been formed from high manganese steel, suggesting uses in other fields for stampings of this tough, wear-resisting alloy.

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Tests made by manufacturers of the cutting alloy prove satisfactory.

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Economies effected by hydraulic press installation are substantial.

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Gear rims are forged, centers are built up of plate sections, welded throughout.

Forging Hammer Saves 25 Per Cent of Air

Tests reveal that improved motion valves enable forging hammer to operate on 25 per cent less air.

IT PAYS TO READ THE ADVERTISING PAGES REGULARLY

Pittsburgh

NEGOTIATIONS are under way by Consolidated Gas & Distillation Co., Chicago, for purchase of former plant of American Steel Foundries, Inc., Sharon, Pa., inactive since close of World War. Property consists of about 13 acres improved with four main buildings, and will be used by acquiring company for coal distillation plant for production of different by-products. Purchasing company has coal mines in Butler County.

Pennsylvania Electric Co., Johnstown, Pa., has arranged for a bond issue of $6,000,000, part of proceeds to be used for extensions and improvements. Company is affiliated with Erie Lighting Co., Erie, Pa., and is operated as unit of Associated Gas & Electric System, 61 Broadway, New York.

National-Erie Corpn., Pittsburgh, has been organized by W. H. MacAfee, 1809 Clark Building, and associates to take over and operate National-Erie Co., First National Bank Building, manufacturer of iron and steel castings and other metal products. Mr. MacAfee is treasurer of new organization. Other officials include J. H. Beal, Jr., and John C. Bane, Jr., both of Pittsburgh.

Board of County Commissioners, City-County Building, Pittsburgh, has authorized an additional appropriation of $500,000 for Allegheny County Airport, now in course of construction, making total fund of $3,501,000 for field. New appropriation will be used in part for purchase of equipment and for erection of bulk gasoline storage and distributing plant. It is proposed to have airport ready for service early in fall. Norman F. Brown is director of Public Works, in charge.

Pittsburgh Forging Co., First National Bank Building, Pittsburgh, with main plant at Coraopolis, Pa., has arranged for purchase of 40-acre tract at Ecorse, Mich., and will use later for new branch plant.

Board of Education, Irwin, Pa., contemplates installation of manual training equipment in new two-story junior high and grade school to cost over $175,000, for which bids are being asked on general contract until June 10. Hunter & Caldwell, Central Trust Building, Altoona, Pa., are architects.

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New England

PLANS are being completed by Lux Clock Co., Waterbury, Conn., manufacturer of clocks and clock mechanisms, for plant addition, to cost over $65,000 with equipment. Thomas M. Freney, Waterbury, is architect.

Edison Electric Illuminating Co., 39 Boylston Street, Boston, will soon break ground for new power plant for central steam heating, to cost over $650,000 with equipment. Building contract has been let to W. A. & H. A. Root Co., 250 Stuart Street. Wadsworth, Hubbard & Smith, 11 Beacon Street, are architects.

Lloyd F. Plummer and John W. Filoon, 280 North Warren Avenue, Brockton, Mass., have organized L. F. Plummer Machine Co., Inc., with capital of $20,000, to operate a general foundry and machine shop.

Water Department, City Hall, Cambridge, Mass., plans installation of electric-operated pumping machinery and other power equipment in connection with extensions and betterments in municipal waterworks. A fund of $800,000 is being arranged for project.

State Department of Mental Diseases, Commonwealth of Massachusetts, Boston, has plans for a one-story industrial shop at State school at Belchertown, to cost about $45,000 with equipment. Kendall Taylor & Co., 142 Berkley Street, Boston, are architects; Richard D. Kimball Co., 6 Beacon Street, is engineer.

Connecticut Light & Power Co., Hartford, Conn., has awarded general contract to George J. Lacourse, 55 George Street, for steam power plant at Bristol, Conn., to cost over $100,000 with equipment. Harold A. Hayden, 175 North Main Street, Bristol, is architect.

Standard Rivet Co., 41 Lincoln Street, Boston, has leased floor in building at 69-71 A Street, South Boston, for new works.

Pratt & Whitney Aircraft Co., Hartford, Conn., has been awarded contract by Navy Department, Washington, for 30 aircraft engines and spare parts, at price of $158,415; also an award from War Department for 30 Hornet type aircraft engines and spare parts, at price of $174,591.

Boston Consolidated Gas Co., 250 Stuart Street, Boston, has awarded general contract to Rust Engineering Co., Koppers Building, Pittsburgh, for five-story equipment storage and distributing plant, with repair department, at Jamaica Plain, including service and garage unit, to cost over $125,000 with equipment.

City of Meriden, Conn., has plans for a new pump house, for which two 300-hp. electric power pumps will be purchased.

Holmes Coal Co., Inc., Pine Street, New Bedford, Mass., will replace a power house and hoisting tower recently damaged by fire.

Acme Shear Co., Hick Street, Bridgeport, Conn., has started work on a two-story addition, 31 x 47 ft.

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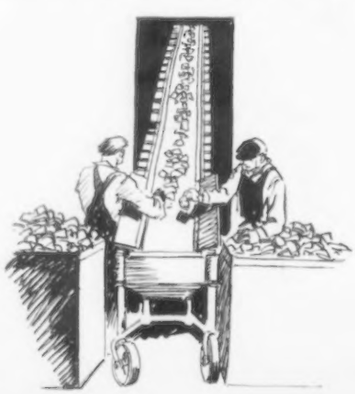
Cleveland

EXPANSION is being carried out by Mullins Mfg. Corpn., Mill Street, Salem, Ohio, manufacturer of steel automobile bodies, fenders, etc., providing for a new line of output at plant No. 3, including refrigerating equipment, evaporators, etc. About $150,000 will be expended in work and equipment, latter comprising new enameling furnace, annealing furnace, press machinery, sand blast and other equipment.

White Motor Co., 842 East Seventy-ninth Street, Cleveland, manufacturer of motor trucks, parts, etc., has taken over property at Montreal for establishment of a new branch assembling plant for Canadian trade. Unit will be operated under direction of White Co., Ltd., L. M. Hart, vice-president, in charge.



Strong, Carlisle & Hammond Co., 1394 West Third Street, Cleveland, manufacturer of steam specialties, drilling equipment, etc., has awarded general contract to William Dunbar Co., 8201 Cedar Street, for new two-story plant, 120 x 150 ft., to cost about $85,000 with equipment. H. M. Morse & Co., 750 Prospect Street, are architects and engineers.

City Council, Shaker Heights, Ohio, E. P. Rudolph, clerk, will soon take bids on general contract for a one-story, L-shaped equipment storage and distributing plant, with service and repair department for municipal machinery, 60 x 146 ft., and 50 x 196 ft., to cost over $75,000 with equipment. Schneider & Hirschfield, 1936 Euclid Avenue, Cleveland, are architects.

Addressograph-Multigraph Corpn., 1814 East Fortieth Street, Cleveland, manufacturer of addressographs, printing and duplicating machinery, parts, etc., has asked bids on general contract for first unit of new plant at Euclid Village, to be one-story, 560 x 620 ft., with three-story office unit adjoining, and one-story power house, to cost about $1,000,000 with equipment. Ernest McGeorge, Inc., 3030 Euclid Avenue, is consulting engineer.

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St. Louis

CONTRACT has been let by Loose-Wiles Biscuit Co., 120 South Fifteenth Street, St. Louis, to Baerveldt & Honig Construction Co., Wainwright Building, for one-story automobile service, repair and garage building, 60 x 185 ft., for company trucks and cars, to cost about $80,000 with equipment.

National Air Transport Co., 5936 South Cicero Avenue, Chicago, has taken bids on revised plans for one-story hangar, 120 x 120 ft., with lean-to extension for machine and repair shop, at municipal airport, Kansas City, Mo., to cost about $85,000 with equipment. R. H. Higgins, address noted, is company engineer.

Od-Peacock-Sultan Co., 112 North Second Street, St. Louis, manufacturer of industrial chemicals, etc., will soon take bids on general contract for a four-story and basement factory, 40 x 125 ft., to cost over $100,000 with equipment. Clymonts & Heinicke, Wainwright Building, are architects.

Nebraska Power Co., Omaha, Neb., has arranged for a bond issue of $16,500,000, part of proceeds to be used for extensions and improvements in power plants and system, financing, etc.

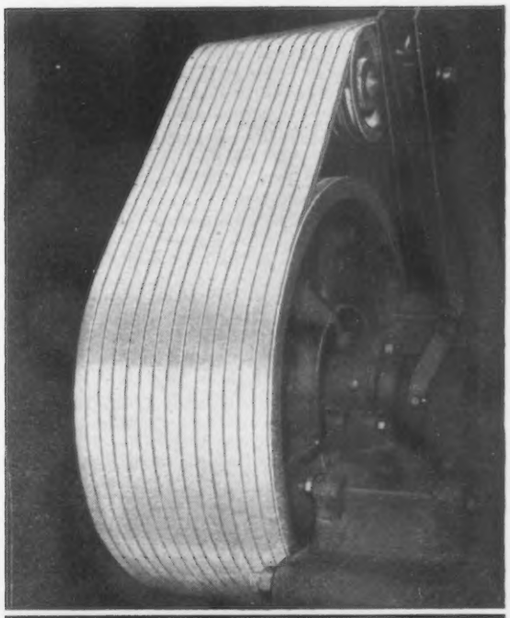
Barton County Flour Mills Co., Great Bend, Kan., has awarded general contract to Jones-Hettelsater Construction Co., Mutual Building, Kansas City, Mo., for addition to grain elevator, including elevating, conveying, screening and other equipment, to cost over $90,000.

Hill Packing Co., Topeka, Kan., recently organized by Burton Hill, Topeka, and associates, has plans for a new meat-packing plant, to cost about $45,000 with equipment.

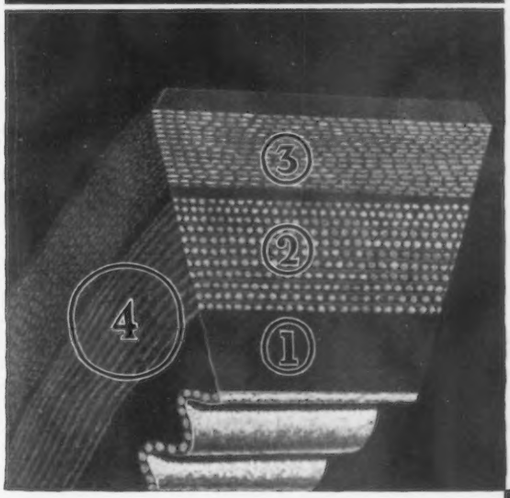
Contract has been let to Smiser Construction Co., 2300 North Broadway, Oklahoma City, Okla., for one-story and basement building, 125 x 140 ft., to be occupied under lease by General Motors

Are you losing money

BECAUSE OF POWER TRANSMISSION TROUBLES?



COMPLETE DRIVES—PULLEYS AND BELTS—IN STOCK. ALL RATIOS, 2 H. P. TO 100 H. P.



Every time you stop your machinery because of belt troubles, you're losing money. Every time any unit falls down in smoothness of performance or in quality of output because of faulty speeds, vibration or breakdowns, you're losing money. Every time you waste labor, time and expense on the upkeep and repair of old-fashioned drives, you're losing money. And it's rightfully *yours* . . . it's money you've really earned . . . money you could easily save . . . easily keep for yourself. Yet you're losing it . . . all because you can't keep your machinery running *smoothly* and *dependably*.

You Need Dayton Cog-Belt Drives

Daytons are dependable, care-free . . . economical. They deliver the maximum amount of power, smoothly controlled, to driven machinery. And because Dayton Cog-Belts last so much longer . . . without expensive upkeep . . . without dressing . . . without dust-catching oil or grease, they pay for themselves many times over in just a short time. And they save space.

Investigate for yourself. Ask for a Dayton Cog-Belt catalog and a sample section of the belt. Write today.

THE DAYTON RUBBER MANUFACTURING COMPANY
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1 Cog Section . . . permits high speeds around small-diameter pulleys, without heating, internal friction, bulging, rippling or crawling. Daytons are "built to bend."

2 "Neutral Axis" . . . the strength section permanently pre-stretched while kept under tremendous tension in the vulcanizing chamber. This process is patented.

3 Outer Section . . . for balance. Built up of bias-cut fabric so laid that when the belt is die-cut, the end-grain comes flush with the side walls. Assures firmer grip . . . makes positive speed control possible.

4 Entire belt die-cut . . . for precision. Daytons are accurate and *stay* accurate. They do not squash, buckle or turn over in the pulley grooves.

Dayton
COG-BELT DRIVES

Truck Co., Pontiac, Mich., as a factory branch, service and storage plant, to cost over $100,000 with equipment.

Orr Brothers, Clay Center, Neb., are planning erection of new steam-operated electric power plant, to cost about $80,000 with machinery. It is expected to begin work during summer.

City Council, Hominy, Okla., has plans for a municipal electric light and power plant, to cost about $160,000 with equipment. V. V. Long & Co., Colcord Building, Oklahoma City, Okla., are consulting engineers.

J. I. Case Co., Racine, Wis., manufacturer of agricultural machinery, farm implements, etc., has asked bids on general contract for one-story factory branch and distributing plant, 50 x 210 ft., at Oklahoma City, to cost close to $75,000 with equipment.

Premier Pulley & Weatherstrip Co., St. Louis, care of Lewis S. Haslam, Telephone Building, recently organized by Mr. Haslam and associates with capital of $15,000, plans operation of local factory for manufacture of mechanical specialties.

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Cincinnati

BIDS have been asked on general contract by Department of Public Works, City Hall, Cincinnati, for two municipal automobile service, repair and garage buildings to cost over $100,000 with equipment. City engineering department, City Hall, is in charge.

William G. Rehn & Sons, 454 Bank Street, Cincinnati, meat packers, will soon begin erection of two-story addition, 62 x 75 ft., to cost over $45,000 with equipment. Cold storage and refrigerating machinery will be installed. John J. Wilkins, 1107 Bates Street, is architect.

Dayton Airplane Engine Co., Dayton, Ohio, manufacturer of aeronautical engines, parts, etc., has purchased controlling interest in American Aeronautical Corpn., 730 Fifth Avenue, New York, with aircraft plant at Port Washington, L. I. Purchasing company has arranged for increase in capital from 400,000 to 1,000,000 shares of stock, no par value, part of proceeds to be used for acquisition noted and other expansion. Capt. Ugo V. d'Annunzio is president of Dayton company, and is also head of Isotta-Fraschini Motors, Inc., 119 West Fifty-seventh Street, New York, affiliated with company of similar name with main works at Milan, Italy.

Contracting Officer, Wright Field, Dayton, will receive bids until June 16 for 500 shackle assemblies, bomb type, and eight propeller hub assemblies; until June 9 for 1680 switch assemblies; until June 10 for 600 motor assembly triggers, 200 switch assembly gun controls, 164 steel trays and 164 adjustable steel stands.

F. W. Schwenck, Ludlow, Ky., and associates have organized Carran Foundry & Smelting Works, Inc., with capital of $100,000, and will operate local plant for production of iron, steel and other metal castings. T. E. Darlington, Ludlow, is interested in new organization.

Southern Industries & Utilities, Inc., Chattanooga, Tenn., care of W. G. Waldo, Chattanooga, engineer, has secured preliminary permit for a hydroelectric generating plant on Lower Tennessee River, about 20 miles above mouth of stream. Station will have initial capacity of 94,000 hp., and will cost over $30,000,000 with power dam, transmission lines and other structures.

Board of Trustees, Fisk University, Nashville, Tenn., has plans for new power house for central heating, to cost close to $60,000 with equipment.

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Indiana

BIDS will be received by Board of School Commissioners, 150 North Meridian Street, Indianapolis, until June 9 for two automatic underfeed stokers for school No. 51. A. B. Good is business director.

C. C. Shipp, 230 East Ohio Street, Indianapolis, head of C. C. Shipp & Co., 212 Castle Hall, manufacturer of ventilating and humidifying apparatus, has awarded contract to J. G. Karstedt Construction Co., Architects & Builders Building, for hydroelectric generating plant on Flat Rock River about nine miles from Shelbyville, including gate house, etc., with power dam, 20 x 238 ft. Installation will include two water turbines and generator units and cost over $600,000 with transmission system. Shaeffer & Gift, 208 Castle Hall, are consulting engineers.

National Radio & Television Corpn., Indianapolis, care of Frederick E. Schortemeier, Circle Tower Building, attorney, recently organized, plans operation of local factory for production of radio equipment and television apparatus, parts, etc. J. Hiram Johnson, Indianapolis, is interested in new company.

Municipal Light and Water Department, Garrett, will soon take bids on general contract for two-story and basement addition to municipal electric light and power plant, 24 x 74 ft., to cost over $35,000 with equipment. A. M. Strauss, Cal-Wayne Building, Fort Wayne, is architect.

United States Radio & Television Corpn., Marion, will develop facilities for production of super-heterodyne radio sets, including parts and assembling, for which it has recently secured license for manufacture. Following recent order totaling about $225,000, plans are under way to double present working force of 500 persons early in June.

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Gulf States

PLANS are under way by Master Petroleum Co., Waco, Tex., for new oil refinery at East Waco, to cost close to $100,000 with equipment. S. J. T. Smith, Waco, is president.

Constructing Quartermaster, Fort Sam Houston, Tex., will receive bids until June 16 for two hangars for United States Air Corps, each with one annex and compressor room, at Duncan Field, Tex.

Calcasieu Parish School Board, Lake Charles, La., contemplates installation of manual training equipment in new two-story high school to cost close to $100,000, for which plans will be prepared by Livesay & Weidemann, San Jacinto Life Building, Beaumont, Tex., architects. School will replace a structure near Lake Charles, recently destroyed by fire.

Waggoner Refinery Co., Electra, Tex., is considering a new bulk oil storage and distributing plant at Dalhart, Tex., to cost about $25,000 with equipment.

Fort Pierce Airways, Inc., Fort Pierce, Fla., is considering new hangar with repair and reconditioning facilities, to provide for battery of 15 planes at one time, to cost over $65,000 with equipment. F. M. Upton is general manager.

Board of Education, San Antonio, Tex., will postpone opening of bids recently called for two buildings for new vocational high school, including remodeling of three existing buildings and will set date in near future. Project will cost about $180,000 with equipment. Harvey L. Smith, National Bank of Commerce Building, and Phelps & Dewees, Gunter Building, are architects.

United States Engineer Office, P. O. Box 45, Jacksonville, Fla., will receive bids until June 9 for one dredging pump and spare parts.

City Council, Palestine, Tex., has been authorized to arrange bond issue of $200,000, fund to be used for establishment of municipal airport, including hangar with repair facilities, oil storage and distributing facilities and other units. Tract of 285 acres west of city is being considered for field. Chamber of Commerce is interested in project.

L. F. Boone, Arp, near Tyler, Tex., operating a local oil refinery recently completed, is planning extensions in topping division, to provide for increase of about 600 bbl. daily, to cost over $50,000 with equipment.

Cotton Centration Co., Commerce Building, Galveston, Tex., is considering one-story addition to storage and distributing plant, 325 x 360 ft. to cost about $70,000 with equipment.

Board of Public Works, Dallas, Tex., is arranging for expansion at Love Field municipal airport, including acquisition of 60 acres adjoining for enlargements, for which a bond issue of $300,000 recently was voted. Preston Sneed is director of airport.

W. S. Grimes, Hillsboro, Tex., is at head of project to build a new ice-manufacturing plant, with electric-operated machinery, to cost close to $55,000. W. D. Little is also interested in enterprise.

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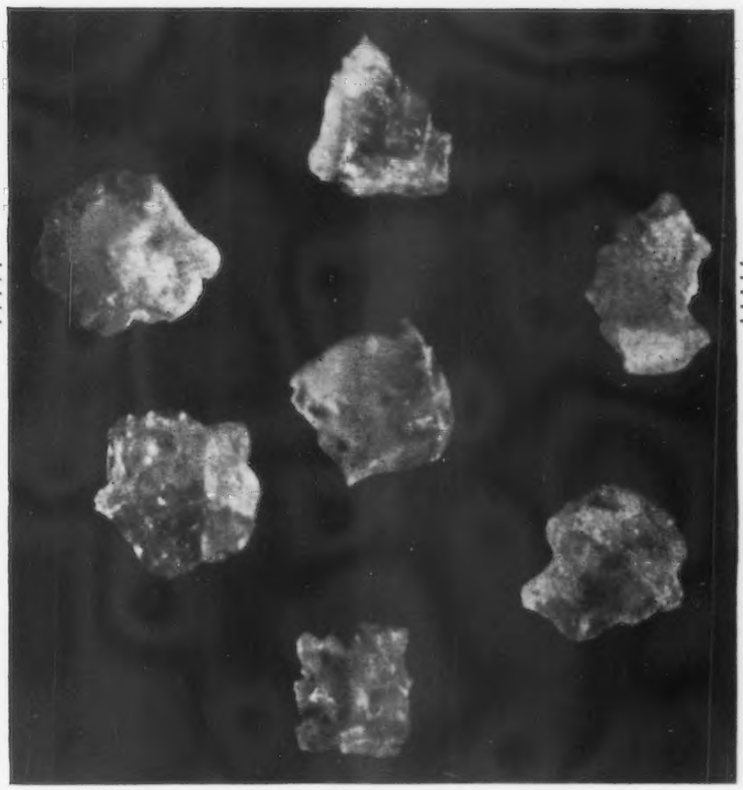
Pacific Coast

PLANS have been filed by Maine Machine Works, Central Avenue and 109th Street, Los Angeles, for new one-story machine shop, 100 x 120 ft., pattern shop and smaller buildings, to cost close to $45,000 with equipment. Industrial Building Co., 6624 Stanford Avenue, is engineer and contractor.

George R. Borrmann Steel Co., Fourth and Grove Streets, Oakland, Cal., has rejected bids recently received for one-story storage and distributing plant to cost about $35,000 with equipment, and will have revised plans prepared at once. H. H. Bolin, Financial Center Building, is architect and engineer.

RKO-Pathe Studios, Washington Boulevard, Culver City, Cal., has revised plans for a new one-story shop unit, 140 x 240 ft., at its local film laboratory, to cost over $100,000 with equipment. Bids will be asked soon on general contract.

Board of City Trustees, Whittier, Cal., is planning installation of two horizontal centrifugal pumping units, electric-operated, and other power equipment in con-



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STILL SUPERIOR . . .

"TP" was the first—the original "Surface Tenacity" polishing grain.

- The first grain to have the quality of greater holding power.
- It doesn't pull out of its glue setting—it wears out doing its full duty of polishing—"Surface Tenacity" is the answer.
- And it's free and clean of flats and splinters—accurate in its grading—hard, sharp, tough, angular grains, that stand up to the job, increasing the production of better finishes.

Glad to arrange for Trial Tests in your Polishing Room

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nection with improvements in sewage disposal plant. Black & Veatch, 307 South Hill Street, Los Angeles, are consulting engineers.

Vermont Marble Co., 244 Brannan Street, San Francisco, has plans for a one-story storage and distributing plant, to cost over $25,000 with equipment. Installation of a crane and other material-handling equipment is planned. Lewis P. Hobart, Crocker Building, is architect.

University Hotel Garage Corpn., Brooklyn Building, Seattle, will soon take bids on general contract for a three-story and basement service, repair and garage building, 115 x 125 ft., to cost over $100,000 with equipment. A metal plating, battery repair and other mechanical departments will be installed in addition to machine shop and parts division. Weldon D. Becket, Brooklyn Building, is architect.

Northwest Oil Burner Corpn., Seattle, care of Edward M. Hay, Colman Building, recently organized with capital of $50,000, plans operation of factory for manufacture of oil burners and oil-burning equipment. L. C. Buschmann is one of heads of company.

Board of Education, Consolidated School District 206, Mossyrock, Wash., has authorized installation of a manual training department in new high school, for which E. J. Breseman, Perkins Building, Tacoma, Wash., is architect.

H. C. Keyes, Kingman, Ariz., is at head of project to build an artificial gas plant and system at Las Vegas, Ariz., where franchise is being secured. Plant will have a capacity of about 300,000 cu. ft. daily, and will cost over $200,000 with equipment. A company will be organized to carry out enterprise.

Rainier Pulp & Paper Co., Shelton, Wash., has arranged for a bond issue of $2,500,000, part of fund to be used for extensions and improvements in local mill.

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Foreign

PROVISIONAL Government, Buenos Aires, Argentina, is considering erection of about 400 or more State-owned grain elevators in interior of country and number of large terminal elevators at principal ports.

Mexican Eagle Oil Co., Mexico City, Mexico, has work under way on a new local oil refinery, to cost over $350,000 with machinery. Construction is also in progress on a new pipe line from Palma Sola, State of Vera Cruz, to refinery site, about 140 miles, to include seven pumping plants, booster stations and other operating facilities. A storage and distributing plant will be located at refinery.

German-American Tobacco Co., recently organized by Ery Kehaya, president of Standard Commercial Tobacco Co., 1 Pershing Square, New York, and associates, is planning establishment of new factory in Germany for cigarette manufacture, using automatic machinery for complete operation under straight-line production system. It is proposed to take over present plant of Standard company at Bremen for initial unit. New company is capitalized at $10,000,000 and 3,000,000 shares of stock, no par value.

New South Wales Government Railways, Sydney, Australia, are asking bids until July 8 for one 2500-kw. electric alternator with accessories; also for one jet condensing plant for installation at Lithgow power station.

North European Oil Co., Berlin, Germany, has disposed of a number of leases in oilfields at Hanover, Oldenburg and Brunswick to Royal-Dutch-Shell Co., Amsterdam, Netherlands, covering about 600,000 acres of oil lands for about $900,000. North European company will use large part of proceeds for development of other leases in German oilfields, with installation of drilling equipment, pipelines, storage and distributing equipment.

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Canada

PREMISES at 179 John Street, Toronto, have been secured by Noma Electric Co. of Canada, Ltd., manufacturer of electric specialities, lighting sets, etc., and equipment will be installed immediately. Company is a subsidiary of Noma Electric Corpn., New York, which recently purchased Masservey Industries, Ltd., Bridgeburg, Ont. Latter business will be consolidated in Toronto plant.

Polyomet Radio Mfg. Co., New York, has taken over Sanford warehouse building on St. Catharine Street South, Hamilton, Ont., for manufacture of radios, parts, etc. Company proposes to spend $500,000 on plant and equipment within a year. Guy Long will be president of Canadian company.

City Council, Granby, Que., J. H. Bergeron, clerk, contemplates purchase of centrifugal pump for waterworks plant.

American Oxycop Co., formerly located in Detroit, has removed its offices to 117 Wellington Street West, Toronto, Ont. Company contemplates establishing an office and factory in Buffalo for manufacture of gas flame cutting machines, patented by Hancock Co., Croydon, England.

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NEW TRADE PUBLICATIONS

Railings.—Vulcan Rail & Construction Co., Maspeth, N. Y. A 76-page catalog devoted to pipe railing, fences and special construction work. Numerous illustrations show the company's interior and exterior installations of railings at industrial plants, railroad platforms, bridges, parks, stairways and balconies of buildings and for other purposes. Various designs of fittings and complete railings are shown and specifications furnished for all sizes.

Industrial Ovens.—Foundry Equipment Co., Cleveland. Catalog No. 31, describing industrial ovens for a variety of heating purposes. Among the uses are japan, enamel, paint and lacquer drying; armature and insulating varnish baking, lithographing, ceramic drying, rubber curing, low-temperature heat treating, chemical drying and other manufacturing processes requiring temperatures up to 900 deg. F.

Compression Fittings.—Bailey Meter Co., 1050 Ivanhoe Road, Cleveland. A 16-page bulletin describing "Dieform" compression fittings for use with copper or steel tubing for connections to metering equipment and other small service lines for water, oil, steam, compressed air or gas. Methods of bending tubing and installing fittings are described.

Portable Compressors.—Sullivan Machinery Co., 400 North Michigan Avenue, Chicago. Illustrated pamphlet announcing new portable compressors of the railroad type having displacements of 110 to 310 cu. ft. per min., the different sizes being able to operate from 4 to 16 tie tampers.

Boilers.—Whiting Corpn., Harvey, Ill. Folder giving results of evaporative tests made of a model heating plant exhibited at the last Midwest Power Exposition in Chicago. Equipped with a Whiting stoker, the 70-hp. boiler developed an average boiler efficiency of 75.2 per cent with Western coal screenings as fuel.

Positive Drives.—Link-Belt Co., Indianapolis. Illustrated booklet, No. 1293, describing positive drives such as silent chain, roller chain, herringbone speed reducers, worm gear speed reducer, steel and malleable chained and the P. I. V. variable-speed transmission.

Monel Metal and Pure Nickel.—International Nickel Co., New York. "Engineering Metals for the Process Industries" is the title of a copiously illustrated 60-page bulletin which contains articles on various applications of these two metals to certain chemical and other process industries. There are several pages of advertising.

Electric Heat.—Westinghouse Electric & Mfg. Co., New York. A four-page leaflet, illustrated, discusses the advantages of some of the electrical heat-treating furnaces produced by this company.

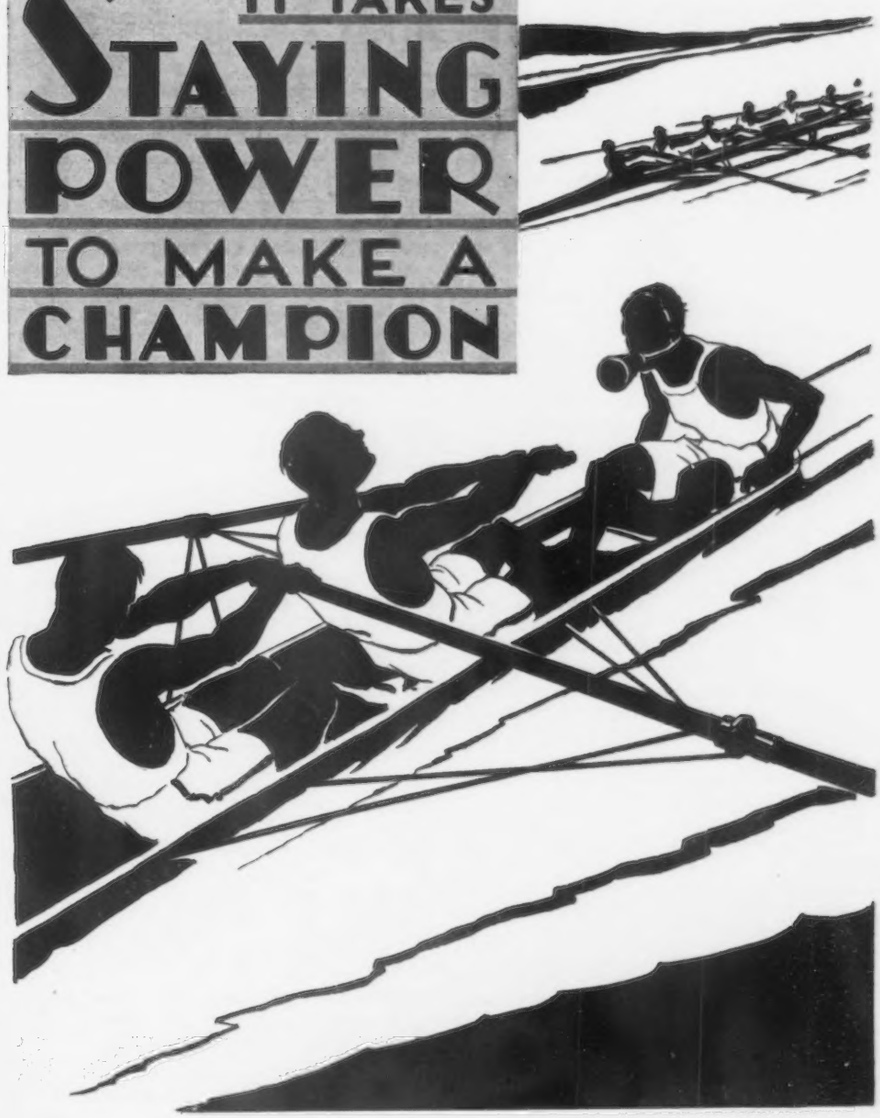
Purite.—Mathieson Alkali Works, New York. A two-page leaflet describes some of the results obtained from the use of the desulphurizing compound, as practised by the Crane Co., Chicago, and other users.

Jig Borer.—Keller Mechanical Engineering Corpn., 70 Washington Street, Brooklyn, N. Y. Twelve-page attractively illustrated pamphlet on described in THE IRON AGE of April 16, the Kellocater jig boring machine.

Setscrews.—Bristol Co., Waterbury, Conn. Bristo hollow head safety setscrews, socket head capscrews and stripper bolts are described in a 36-page catalog, No. 825, giving dimensions and prices. Threads obtainable include the Dardelet self-locking type as well as standard forms.

Electrical Equipment.—Electric Controller & Mfg. Co., Cleveland. Series of bulletins covering separator magnets for removal of tramp iron, 110-550 volt automatic compensators for squirrel cage and synchronous motors, type ZHS 2300-volt magnetic contac-

IT TAKES STAYING POWER TO MAKE A CHAMPION



SUPREMACY on the river . . . a quarter-mile to go . . . rival shell creeping up . . . it seems impossible to add another ounce of driving power to aching backs . . . but *again* the coxswain snaps the order to "step it up" . . . and *again* the fighting hearts of these eight men respond . . . they hold their lead . . . the race is won . . . "Staying Power."

The speed, accuracy and quality of threads produced, with their years of dependable service, have made H & G Die Heads champions of their field.

H & G chasers are made from finest high speed steel. Hobs are ground in the thread *after* hardening. New heat treating equipment adds that degree of hardness and toughness which makes for long life. The H & G method of finishing *after hardening* gives complete control of clearance and lead and straightness.

H & G Die Heads will cut down your threading costs. We'll be glad to send you one for 30-day free trial.

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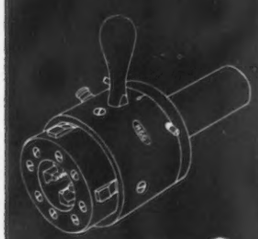
for all machines on which threads are cut. All styles of H & G Die Heads of a given size take the same chasers, thus simplifying chaser stock.

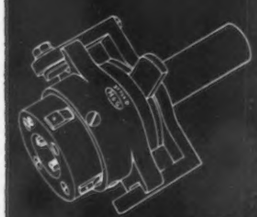
STYLE EE

(Rotary)
Designed for automatics, threading machines and bolt cutters, where the die head rotates.



STYLE C

Hand closing Die Heads for hand turret machines.



STYLE D

Head for Brown & Sharp Automatics and other small machines.

H&G

DIE HEADS

THE EASTERN MACHINE SCREW CORP.
Truman and Barclay Sts.
New Haven Conn.

Write for description of
H & G FEED PUSHERS
for better stock feeding on Automatic Screw Machines

Business as Others See It

Digest of Current Financial and Economic Opinion

RESTORATION of railroad earnings to a livable basis is viewed by *Financial Chronicle* as the most urgent task before us. Whether this be done through cutting wage rates, through boosting freight rates, through a combination of those or by some other means—that it be done is regarded as vital.

Improvement in buying by the railroads is one of the results of that program which many observers say is needed as a tonic for our whole system. And only through making railroading at least moderately profitable can the roads be relied upon to lend their support to languishing trade in those things which they buy for their own maintenance.

More Buying Urged

Confidence in the business structure can come only through enlargement in buying, thinks New York *Times*. "To restore confidence, men must be sure of their jobs, investors sure of their dividends and capital sure of its profits. To meet all these conditions purchasing is needed."

Considerable difference of opinion is expressed as to where retail prices stand. There are those who view the wholesale slash in wholesale prices with much alarm, and aver that the retailer is still asleep. But the managing director of the National Retail Dry Goods Association is quoted to the effect that retail price cuts in 1930 exceeded wholesale reductions by 4 per cent.

This position is not held by Harvard Economic Society, which says, "the decline in the retail index so far has been less than half as great as in the wholesale. And retail prices, "especially in highly fabricated materials, may be expected to continue declining even after wholesale prices have stabilized."

That business has reached its "resistance level" is argued by *Business Week*, from the smallness of the "week-to-week changes in the composite picture of production, construction and trade activity. . . . Production volume has increased slowly for four consecutive months," mainly in consumer goods.

Look to Early Summer as Augury

How June and July fare will show what we may face in the fall, thinks Poor's. "If the drop is less than normal, it will be accepted as a sign that business has not lost all the gain achieved in the first quarter, and the belief will be encouraged that the long trend is definitely upward."

Low interest rates, says *Commerce and Finance*, "always proved to be an antidote for business depression, and there is no reason to look for any change in this respect."

Dislocated Interchange of Goods

Sharp inequalities in purchasing power among various classes of consumers—a fact widely observed—is called "the crux of our present economic distress," by the First National Bank of Boston. It sees violent price declines in some groups, chiefly raw materials, against more moderate recessions in others. "Industrial wages have shown but a slight decline, while taxes and debts have remained the same."

Meantime April has shown up better than March in several "indexes." But not so much is expected of May's general tendencies.

tors for a.c. motors, motor field rheostats and relays, and vapor-proof and explosion-proof push buttons.

Chrome Cement.—E. J. Lavino & Co., Philadelphia. Folder illustrates use of Kromepatch chrome ore refractory cement in laying furnace linings, boiler arches, etc.

Diesel Engines.—Ingersoll-Rand Co., 11 Broadway, New York. A general description of I-R solid injection diesel engines ranging from 150 to 1200 hp. Dependable operation and economy are stressed.

Self-Tapping Screws.—Parker-Kalon Corpn., 200 Varick Street, New York. Results of comparative vibration, tension and shear tests of hardened self-tapping screws and machine screws are presented in a 12-page booklet with graphs and illustrations.

Pumps.—Brown & Sharpe Mfg. Co., Providence, R. I. Circular listing complete line of pumps, including gear, vane and centrifugal types for hydraulic pressure, circulation and coolant service in machine tool and other applications. Useful engineering data are included.

Diesel Engines.—Cooper-Bessemer Corpn., Mt. Vernon, Ohio. Illustrated folder with specifications of new stationary Type JT engine made in 3, 4, 6 and 8-cylinder sizes with ratings of 150-180, 200-240, 300-360, and 400-480 hp. respectively when operating at 300-360 r.p.m. Accessible location of the spray valves and driving levers below the camshaft permitting removal of the engine head without disturbing the fuel injection system, is a feature.

Centrifugal Pumps.—Hayton Pump & Blower Division of Stacey Engineering Co., Connersville, Ind. Illustrated folder devoted to open impeller type multi-stage centrifugal pumps.

Foreman Training.—Elliot Service Co., 242 West Fifty-fifth Street, New York. A series of booklets with supplementary pamphlets and bulletins comprising a new foremanship development service devoted to the managerial phases of supervisory work.

Self-Opening Die Heads.—Eastern Machine Screw Corpn., New Haven, Conn. A 16-page illustrated catalog with prices and dimensions of self-opening die heads, chasers and accessories for various types of automatic machines. The H & G chaser grinder and threading machines are included.

Perforated Drainage Pipe.—Armco Culvert Manufacturers' Association Middletown, Ohio. Illustrated 24-page booklet devoted to use of corrugated iron pipe for subdrainage installations. Capacities and sizes, formulas and complete instructions for drainage installations are given.

Core Ovens.—Foundry Equipment Co., Cleveland. Bulletin No. 32, 16 pages describes and illustrates continuous conveyor core ovens of the vertical and horizontal types as well as of the roller conveyor type. One of the latter type with five tiers of conveyors recently was installed in the plant of the General Steel Castings Corpn., Eddystone, Pa. Saving in floor space and labor and other advantages of continuous conveyor core ovens are pointed out.

New German Cruiser Has Light Engines

HAMBURG, GERMANY, May 25.—Apart from the fact that the entire hull of the recently launched battle cruiser "Deutschland" is of welded construction, the ship will be driven by unusually light Diesel engines. Built especially for the purpose by the Munchen-Augsburg Maschinen A.G., they will develop 50,000 hp., and weigh only 8 kg. per hp. These engines are being constructed with light alloys in many vital parts. Interior metal on the ship is to be electron instead of aluminum, as originally reported. It is estimated that the total saving in weight by the use of welding in the hull and light metals and engines is 550 tons. The armor plate furnished by the Friedrich Krupp A.G., Essen, is of lighter weight than on most war craft, but is claimed to have great resistance.

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S. G. Taylor Chain Co., Hammond, Ind., next month enters upon its fifty-ninth year in the manufacture of welded chain and fittings. The company is one of the few remaining that is still under the control of the family of its founders. S. G. Taylor, Jr., has been the active head of the business for more than 35 years.